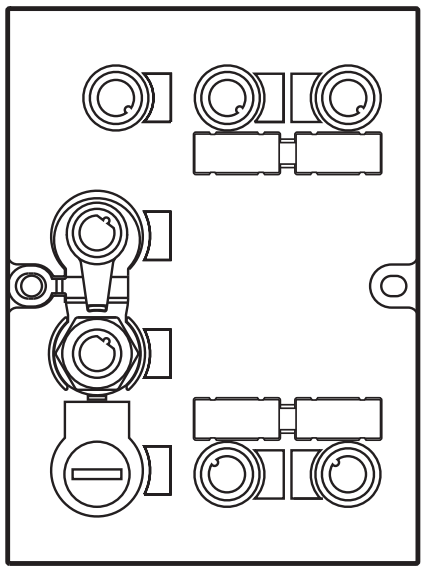
Device Manual
RFID evaluation unit

DTE103

UK



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Contents

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1 Preliminary note

1.1 Symbols used

► Instruction

> Reaction, result

[…] Designation of pushbuttons, buttons or indications

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference

Information
Supplementary note

2 Safety instructions

Please read the operating instructions prior to set-up of the device. Ensure that the device is suitable for your application without any restrictions

If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur

3 Functions and features

The RFID evaluation unit integrates an Ethernet interface and 4 channels for the connection of field devices. Each channel can be used either for the connection of a read/write head or as a input/output to IEC 61131.

The device

- controls the data exchange to the read/write heads or the sensor/actuator level.
- communicates with the higher control level via Ethernet.
- allows device configuration via a web server.

Application examples:

- Material flow control in production lines
- Warehouse management by the automatic detection of stored products
- Tank management, order picking or product tracking

3.1 Configuration via Ethernet interface

- 10 Mbps and 100 Mbps
- TCP / IP - Transport Control Protocol / Internet Protocol
- IT functionality: HTTP server
- M12, twisted pair

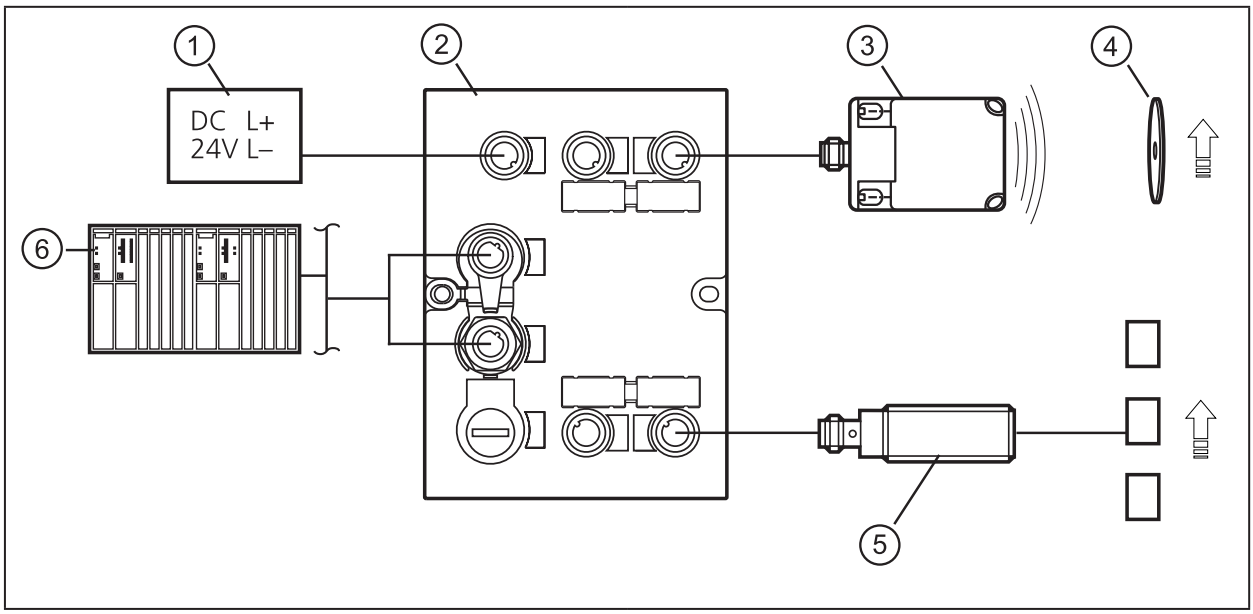
3.2 Functions for commissioning

Via the integrated Webserver it is possible to

- read the UID of the RFID tag
- read the user data area of the RFID tag
- write to the user data area of the RFID tag
- read the input of the IO channels

- write to the output of the IO channels
- read the device information of the evaluation unit
- read the device information of the connected read/write heads
- update the firmware of the read/write heads

4 Function

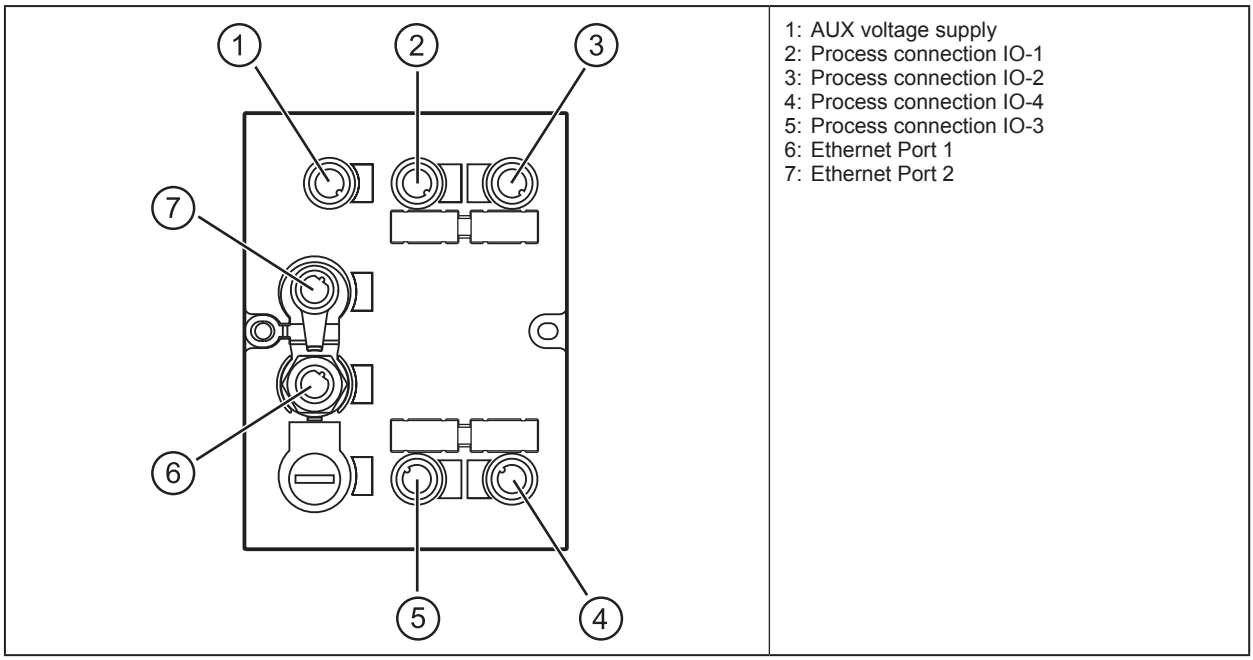


1: Voltage supply
2: DTE103 RFID evaluation unit
3: read/write head type ANT51x / ANT41x
4: RFID tag
5: Sensor
6: Ethernet host

The evaluation unit processes data from up to 4 RFID read/write heads (type ANT41x, ANT42x, ANT43x, ANT51x) or IEC 61131 inputs / outputs. The mode of operation for each channel can be set individually via the EtherCAT controller.

For further information about port configuration, see (→ 9 Configuration)

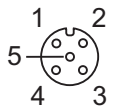
4.1 Connection



1: AUX voltage supply
2: Process connection IO-1
3: Process connection IO-2
4: Process connection IO-4
5: Process connection IO-3
6: Ethernet Port 1
7: Ethernet Port 2

4.1.1 "AUX" voltage supply

► Connect the evaluation unit to the voltage supply using an M12 connection cable.



Pin	Connection
1	24 V DC
2	not used
3	0 V
4	not used
5	not used

4.1.2 Field bus connection EtherCAT In / Out

► Connect the evaluation unit to an EtherCAT controller using a suitable M12 Ethernet connection cable.

Note: screened connection cable required

Pin	Connection
1	TD+
2	RD+
3	TD-
4	RD-

Factory setting of the Ethernet parameters

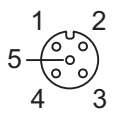
The following values are preset on delivery of the evaluation unit:

Parameters	Factory setting
IP address	192.168.0.79
Gateway address	192.168.0.100
Subnet mask	255.255.255.0
Auto-negotiation	on
DHCP	off

These values are only valid if the evaluation unit start up with the “Emergency System”. By default the Ethernet parameters are set by the EtherCAT controller.

4.1.3 Process connections "IO-1 ... IO-4"

Each process connection can be used as input/output to IEC 61131 or for connection of an RFID read/write head type ANT51x/ANT41x.



Pin	Connection
1	L+
2	switching input (I/Q)
3	L-
4	switching output (C/Qo) or input (C/Qi)
5	not used

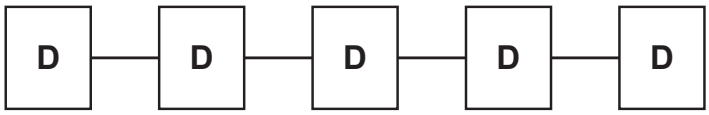
The evaluation unit has to be disconnected from the power supply before field units are connected.

Please note that the total current consumption of the evaluation unit must not exceed the value of 3 A.

You can find information about the matching read/write heads on our website at: www.ifm.com

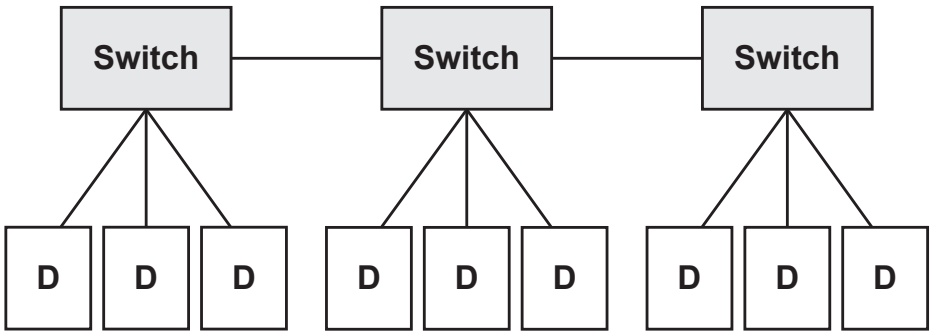
4.2 Allowed network infrastructures

Linear structure:



The linear structure is the default structure for EtherCAT network.

Star structure:



The star structure is only possible with EtherCAT switches.

D: Device

5 Installation

You can find information about installation and electrical connection in the operating instructions for the evaluation unit at: www.ifm.com

6 Operating and display elements

6.1 Reset to factory settings

The Ethernet parameters can be reset to the factory settings. Take the following steps:

► Remove all cable connections from the evaluation unit.

► Insert an electrically conductive bridge between pin 1 and pin 3 on the process connection IO-3.

► Connect the evaluation unit with the voltage supply and wait until the yellow LED indication on AUX and IO-3 flashes at approx. 8 Hz.

► Remove the conductive bridge from process connection IO-3.

► Disconnect the evaluation unit from the voltage supply and connect it again.

> The settings are reset.

6.2 Force firmware update

The firmware of the Evaluation unit can be updated directly from a PC without using an EtherCAT controller.

Execute the following steps:

► Remove all cable connections from the evaluation unit.

► Insert an electrically conductive bridge between pin 1 and 3 on the process connection IO-4.

► Connect the evaluation unit with the voltage supply and wait until the yellow LED indication on AUX and IO-4 flash at approx. 8 Hz.

► Connect the evaluation unit at EtherCAT port “In” with a personal computer.

► Open a web browser and enter the address “http://192.168.0.79”.

► Start firmware update and wait until the firmware is written to the evaluation unit.

► Remove all cable connections from the evaluation unit.

> The firmware update is finished.

Furthermore it is possible to update the firmware over the EtherCAT controller by using the integrated Web server of the evaluation unit or by using the FoE function of the EtherCAT protocol.

Do not interrupt power or disconnect cables from the system while the firmware update is in progress.

6.3 LED indicators

The evaluation unit indicates the current status of the interface via the status LEDs.

6.3.1 LED AUX

LED green	LED yellow	Status	Note
off	off	no voltage supply	U_{AUX} < 5 V
on	flashes at 2 Hz	voltage supply too low	5 V ≤ U_{AUX} ≤ 18 V
On	flashes at 8 Hz	Firmware update is running	Do not switch off power supply
on	off	voltage supply OK	18 V ≤ U_{AUX} ≤ 36 V

6.3.2 LED EtherCAT IN / OUT

LED green	LED yellow	Status	Note
Off	Off	No connection to another Ethernet counterpart	Link status "no link"“
On	Off	Connection to Ethernet counterpart exits, no data exchange	Link status "link", "no traffic"

LED green	LED yellow	Status	Note
On	Flashes sporadically	Connection to Ethernet counterpart exists, data exchange running	Link status "link", "traffic"

6.3.3 LED RUN (operating state)

LED green	Status	Note
Off	Power off or INITIALISATION of the evaluation unit	Check the voltage supply.
Blinking	PRE OPERATIONAL state of the evaluation unit	If this state is not reached, check settings of the device in the PLC
Single Flash	SAFE OPERATIONAL state of the evaluation unit	If this state is not reached, check the configuration string of the device in the PLC
On	OPERATIONAL state of the evaluation unit	-
Flickering	Firmware download in progress	-

6.3.4 LED ERR (error state)

LED red	Status	Note
Off	Power off or no error	Check the voltage supply or The EtherCAT communication of the evaluation unit is in working condition
Flickering	Booting error detected. INIT state reached, but error indicator bit is set to 1 in AL status register	Restart evaluation unit
Blinking	General Configuration Error	Check the configuration string of the evaluation unit in the PLC
Single Flash	Slave evaluation unit application has changed the EtherCAT state autonomously, due to local error	- overload at IO-channel 1..4 - short circuit at IO-channel 1..4
Double Flash	Process data watchdog timeout/ EtherCAT watchdog timeout	Sync Manager watchdog timeout
Triple Flash	Slave application error, e.g. vendor specific AL status code returned	- under voltage at AUX - temperature failure of the evaluation unit - internal fault
On	Critical communication or application controller error	Application controller is not responding anymore (PDI watchdog timeout)

6.3.5 LEDs IO1 ... IO4

The LED indications of the process connections depend on the set mode of the IO channel.

Use as input to IEC 61131

LED green	LED yellow	Status	Note
Off	Off	Interface deactivated	Interface via Ethernet host not configured
On	Off	Interface activated, input C/Qi on L level (0 V)	-
On	On	Interface activated, input C/Qi on H level (24 V)	-
Flashes at 8 Hz	Flashes at 8 Hz	Overload or short circuit	-

Use as output to IEC 61131

LED green	LED yellow	Status	Note
Off	Off	Interface deactivated	Interface via Ethernet host not configured

LED green	LED yellow	Status	Note
On	Off	Interface activated, output C/Qo L-active (0 V)	-
On	On	Interface activated, output C/Qo H-active (24 V)	-
Flashes at 8 Hz	Flashes at 8 Hz	Overload or short circuit	-

Use with RFID read/write heads

LED green	LED yellow	Status	Note
Off	Off	Interface deactivated	Interface via Ethernet host not configured
Flashes at 2 Hz	Off	Interface activated, antenna field off	-
On	Off	Interface activated, RFID tag not in the field	-
On	On	Interface activated, RFID tag in the field	-
Flashes at 8 Hz	Flashes at 8 Hz	Overload, short-circuit or communication error	-

6.3.6 Special evaluation unit - LED indications

LED	Status	Note
Green AUX LED on Yellow AUX LED flashes at 8 Hz Yellow IO1...IO4 LEDs flash at 8 Hz	Evaluation unit is in the service mode "emergency system started".	A firmware update is necessary and can be executed via the web server.
Green AUX LED on Yellow AUX LED flashes at 8 Hz Green IO1...IO4 LEDs flash at 8 Hz Yellow IO1...IO4 LEDs flash at 8 Hz	Major error, evaluation unit has to be returned.	Hardware fault or permanent data in the evaluation unit are corrupt.
Green AUX LED on Yellow AUX LED flashes at 8 Hz Yellow IO3 LED flashes at 8 Hz	Reset to factory settings	-

7 Putting into operation

► Connect the evaluation unit according to the operating instructions.

> After connecting the operating voltage, the evaluation unit is ready for use.

The green power supply LEDs of the read/write heads will light up after enabling the corresponding module in the module configuration.

8 Web server

The evaluation unit is equipped with an integrated web server that allows to

- read the UID of the RFID tag
- read from the User data area of the RFID tag
- write to the User data area of the RFID tag
- update the firmware of the evaluation unit
- update the firmware of the read/write heads

The settings are made via a web browser, e.g. Microsoft Internet Explorer® as from V7.0

To access the Web server following preconditions need to be fulfilled

- EtherCAT master with integrated EtherCAT switch or EtherCAT switch (e.g. Beckhoff CU1128, / EK1122)
- PC connected to the EtherCAT master or EtherCAT switch
- evaluation unit connected to EtherCAT master
- EoE protocol of the evaluation unit activated. The IP address setting of the evaluation unit must be in the network address range of the PC.

► Open the web browser on the PC and enter the IP address which is set in the EoE settings of the evaluation unit.

The evaluation unit must be at least in EtherCAT slave state “Preoperational”.

The actualization time of the Webpages depend on the EtherCAT bus cycle time and the data traffic of the EtherCAT network. The actualization time can vary between 2…30 seconds.

8.1 Verify and set the IP address of the PC

► Activate menu "Internet Protocol Version 4 (TCP/IPv4) Properties".
The Windows menu "Internet protocol (TCP/IP) Properties" is accessible for example via:
Start → Control Panel→ Network and Sharing Center → Change adapter settings → Local Area Connection → Properties.

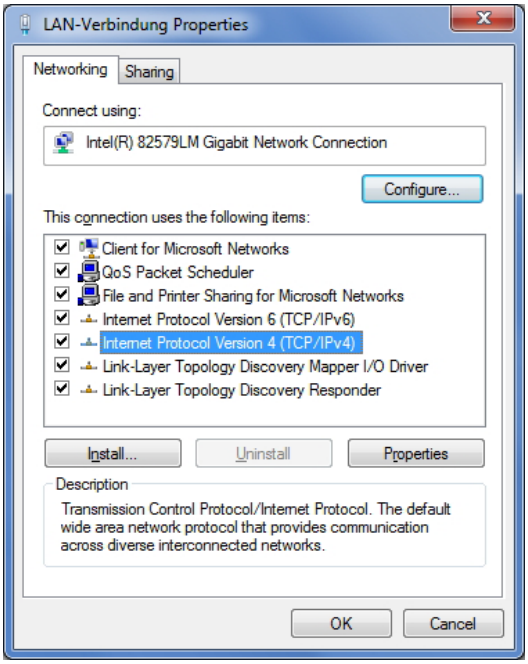
► Select the menu item "Use the following IP address".

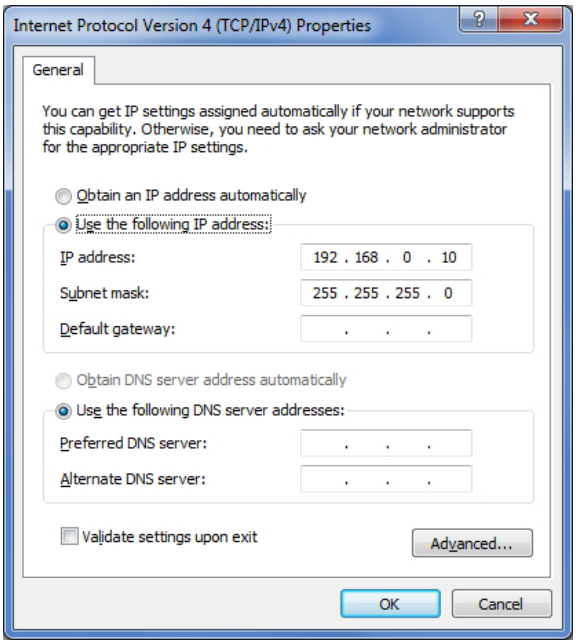
► Verify and set the IP address, if necessary (here e.g. 192.168.0.10).

► Enter the subnet mask (255.255.255.0).

► Leave default gateway blank.

► Confirm the settings with [OK].





Changes in the network settings of the PC require extended user rights.
Contact your system administrator.

8.2 Tab "Home"

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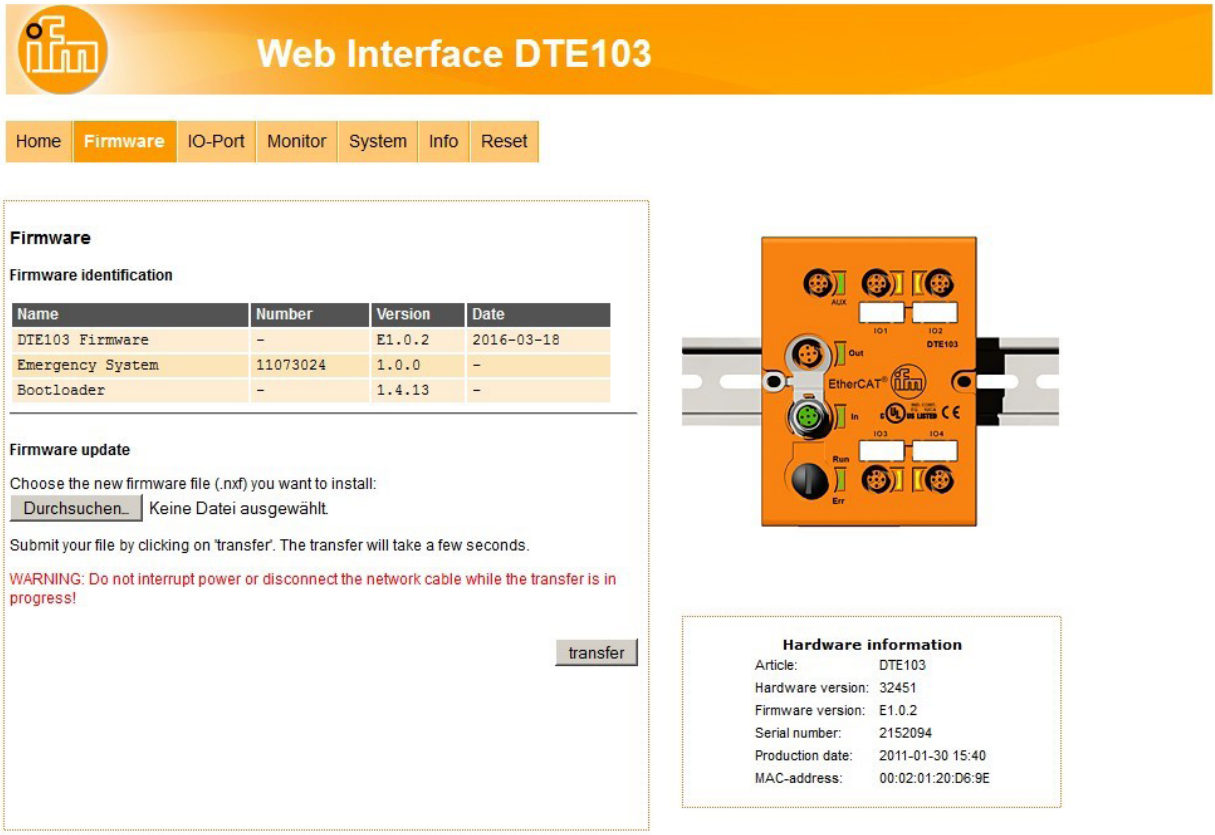
This is the main menu from where all functions of the evaluation unit can be accessed. The user can select the language of the evaluation unit web interface.

8.3 Tab "Firmware"



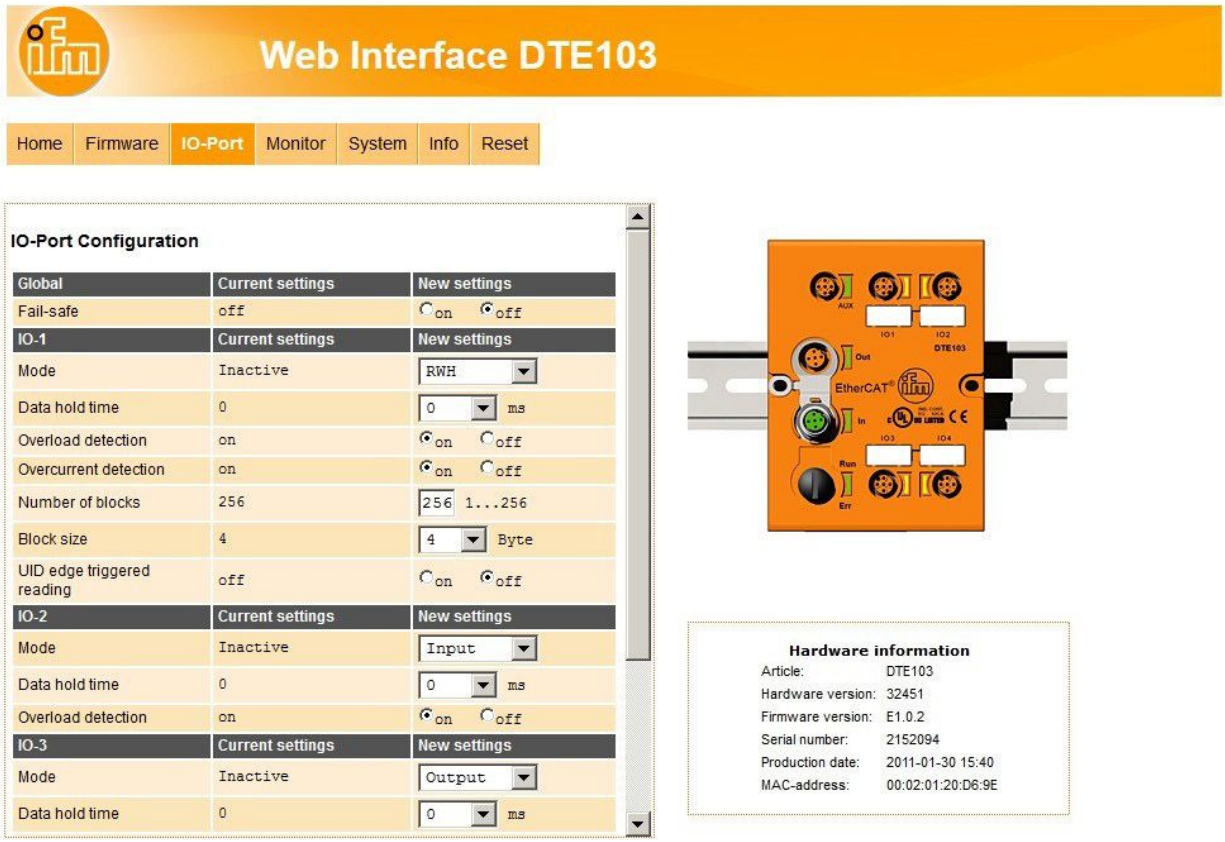
This menu allows to update the firmware of the evaluation unit.

► Open the “Firmware” tab on the browser interface.

► Choose firmware file DTE103.nxf and commit via button [transfer]

Do not interrupt power or disconnect cables from the system while the firmware update is in progress.

8.4 Tab "IO-Port"



This menu allows to configure the IO-Ports of the evaluation unit.

Each IO-channel can be configured to mode „Inactive“, „Input“, „Output“ and „RWH“.

Mode	Function
Inactive	No function, inactive
Input	IEC 61131 input
Output	IEC 61131 output
RWH	RFID read/write head (Type ANT4xx or ANT5xx)

“Data hold time” define how long the RFID data are kept stable. This is helpful if the time interval, in which the RFID tag data are available, is shorter than the host can read these from the RFID unit.

“Number of blocks” define the number of blocks available on the RFID tag.

“Block size” define the number of bytes per block available on the RFID tag.

If the value "Block size" does not match the physically value of the RFID tag, the read and write commands will fail.

“UID edge controlled" allow the reading of the UID of the RFID tag once by setting bit "RD" from 0 to 1 in the process data output image of the controller. This mode is suitable if the user knows when the RFID tag is present in front of the read/write head. The read UID is kept in the data bytes 2…18 stable while bit RD is set to 1.

► Set “Overload detection” to “off” if the load on terminal “L+” is above 0,5 A.

The current is limited to 0,7 A by hardware.

► Set “Overcurrent detection” to “off” if load on terminal “C/Qo” is above 0,5 A.

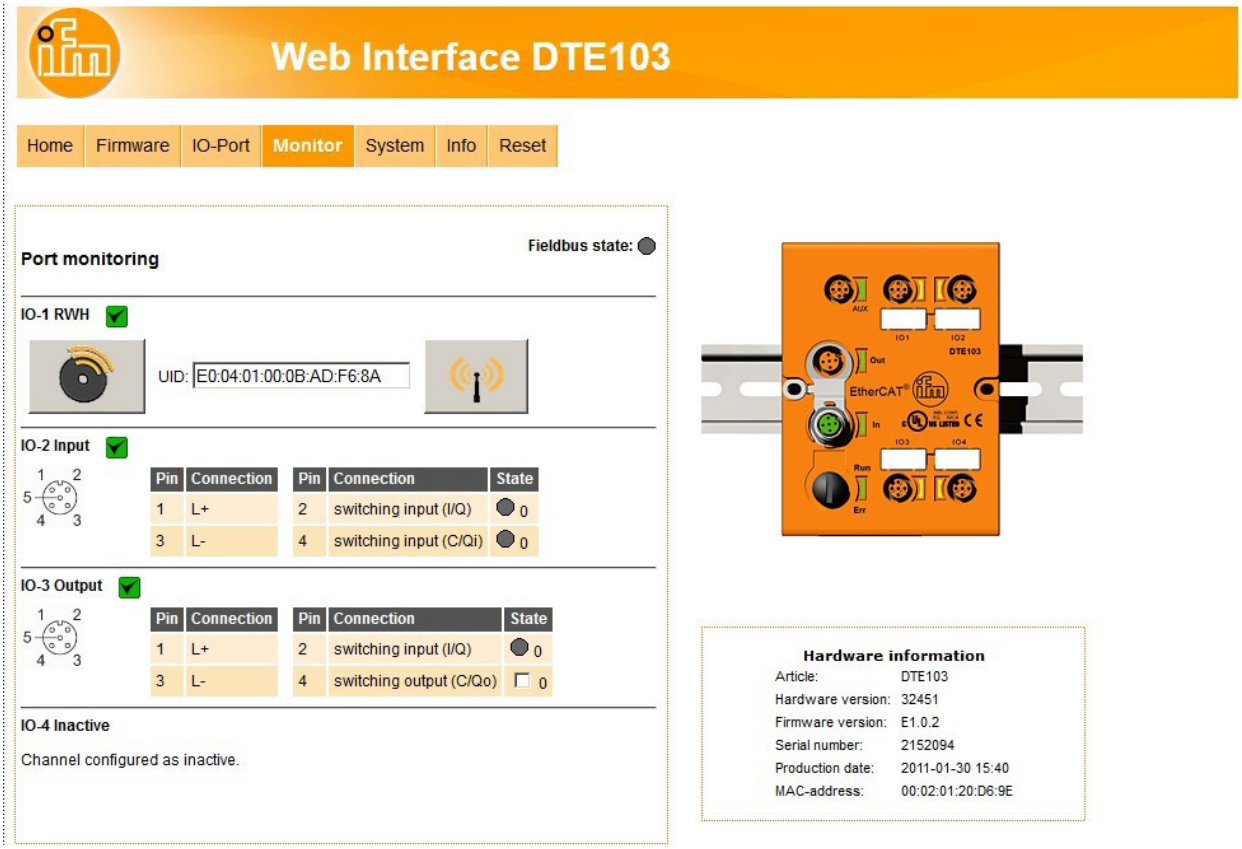
The current is limited to 0,6 A by hardware.

► Set "High Current" to “on” if the current on ports IO-3 and/or IO-4, terminal “C/Qo”, shall be possible to 1 A.

The maximum power input shall not exceed 3,0 A, otherwise the evaluation unit can be damaged.

Button	Function	Remark
Activate and save	The settings are activated and stored non-volatile	After next power-on the stored settings are activated. If the host connect to the evaluation unit and write a new IO-Port configuration the stored values are overwritten
Cancel	Discard changes	-

8.5 Tab "Monitor"

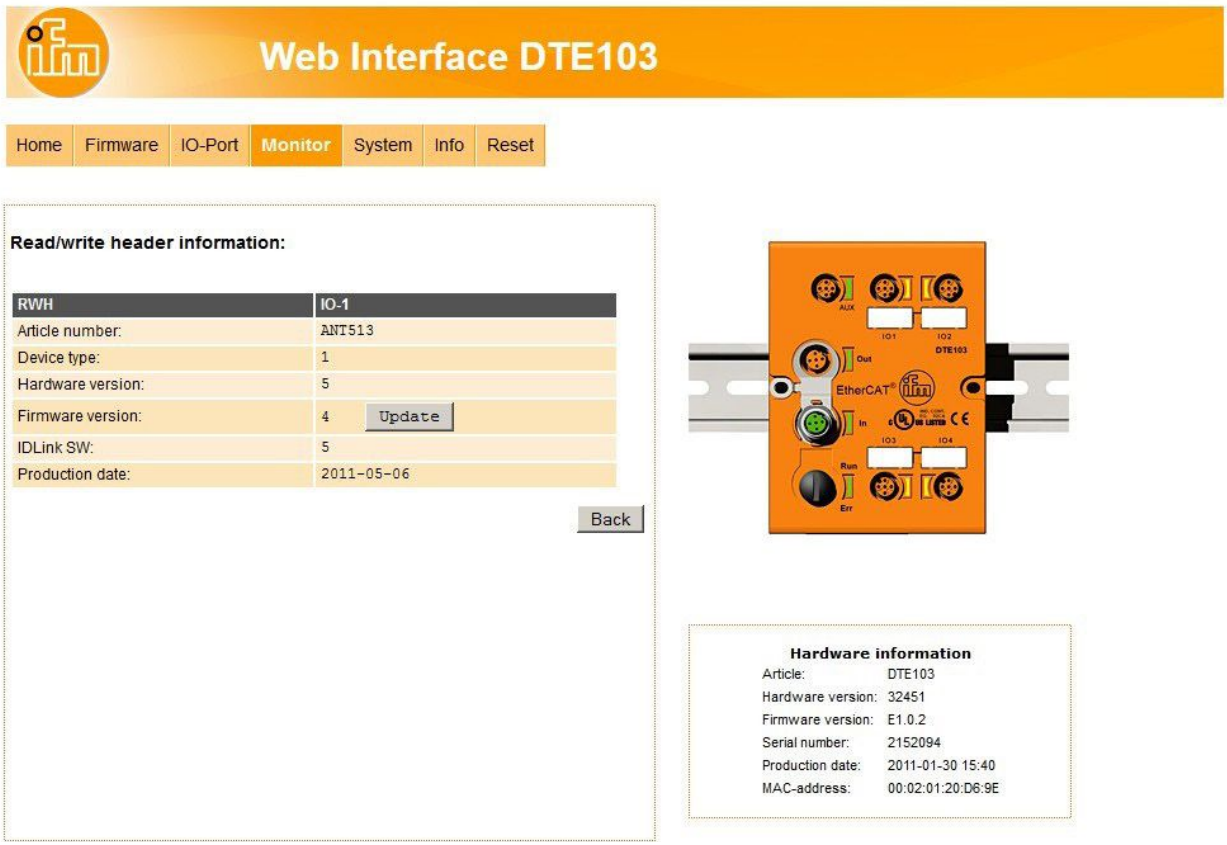


This menu shows the data of each port which is detected by the evaluation unit.

In this example the IO-1 port is configured as RFID read/write head, IO-2 port as input, IO-3 port as output and IO-4 port as inactive.

- ► Click  to switch to submenu "read/write head information" (→ 8.5.1 Tab "Monitor" - read/write head information).
- ► Click  to switch to submenu "Tag monitoring - read and write" (→ 8.5.3 Tab "Monitor" -Tag monitoring).

8.5.1 Tab "Monitor" - read/write head information

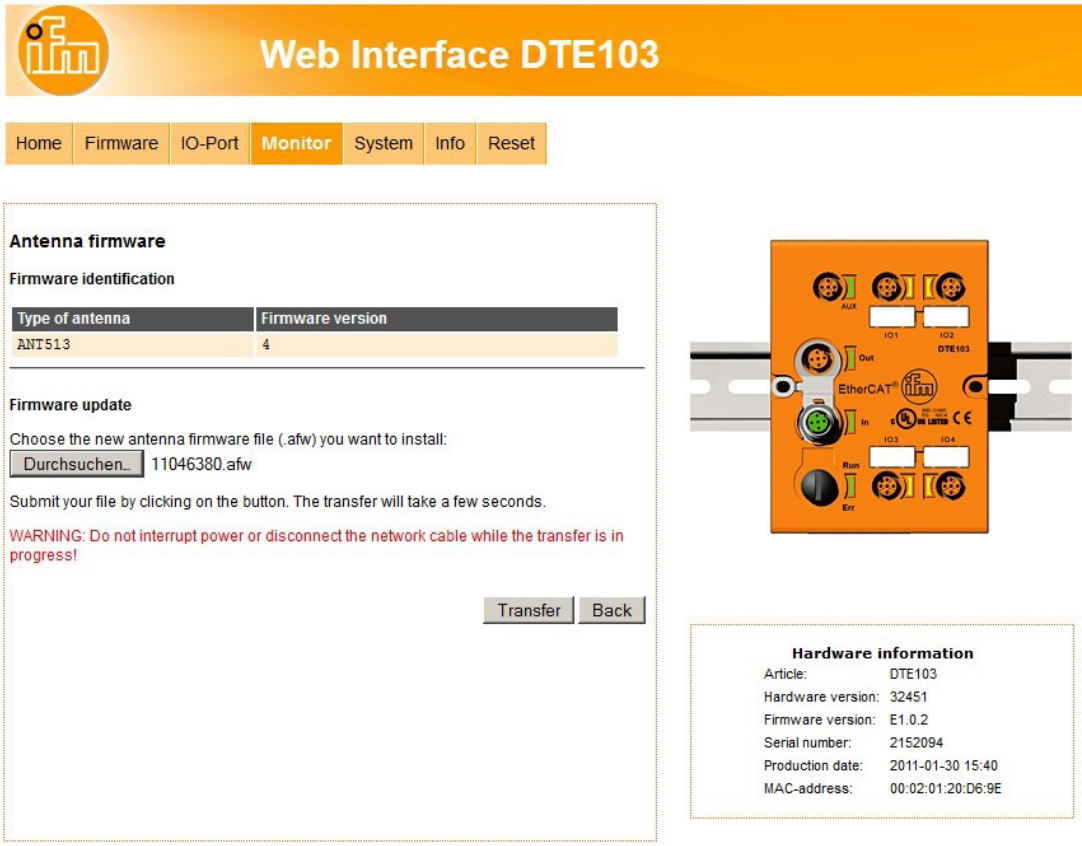


This menu shows the following information about the selected read/write head:

- Article number
- Device type
- Hardware version
- Firmware version
- ID link software
- Production date

Button	Function	Remark
Update	Go to menu “Antenna firmware”	-
Back	Return to the main menu	-

8.5.2 Tab "Monitor" - Antenna firmware



This menu allows to update the firmware of the read/write head connected at the selected port.

► Open the “Firmware” tab on the browser interface.

► Choose firmware file "xxx.afw" and submit via button [Transfer].

Do not interrupt power or disconnect cables from the system while the firmware transfer is in progress.

Button	Function	Remark
Search	Open new dialog window to browse to the read/write head firmware file	-
Transfer	Send antenna firmware to connected read/write head	If the update process is finished the evaluation unit reboots the read/write head automatically. A restart of the evaluation unit is not necessary.
Back	Return to the main menu.	-

If the firmware update fail or the read/write head is not detected by the evaluation unit at the selected IO-port, the read/write head is accessible via web browser and the following URL:

http://<**IP-ADDRESS**>/rwhupdate?ioport=<**IO-CHANNEL**>1&anttype=<**ANTENNA_TYPE**> &fwVersion=<**NUMBER**>&setLng=<**LANGUAGE**>

Parameter name	Description	Remark
IP-ADDRESS	IP address of the evaluation unit [XXX.XXX.XXX.XXX]	IPV4 address
IO-CHANNEL	IO-Channel number [1…4]	-
ANTENNA_TYPE	Article number of the read/write head [e.g. ANT512]	6 digit article number
NUMBER	Firmware number [01]	2 digit number. Shall be set to “01”
LANGUAGE	Language of the website [de, en, es, fr, it, ko, pt, ru, zh]	-

Example of URL:

http://192.168.0.79/diagrwh?ioport=1&anttype=ANT513&fwVersion=01&setLng=en

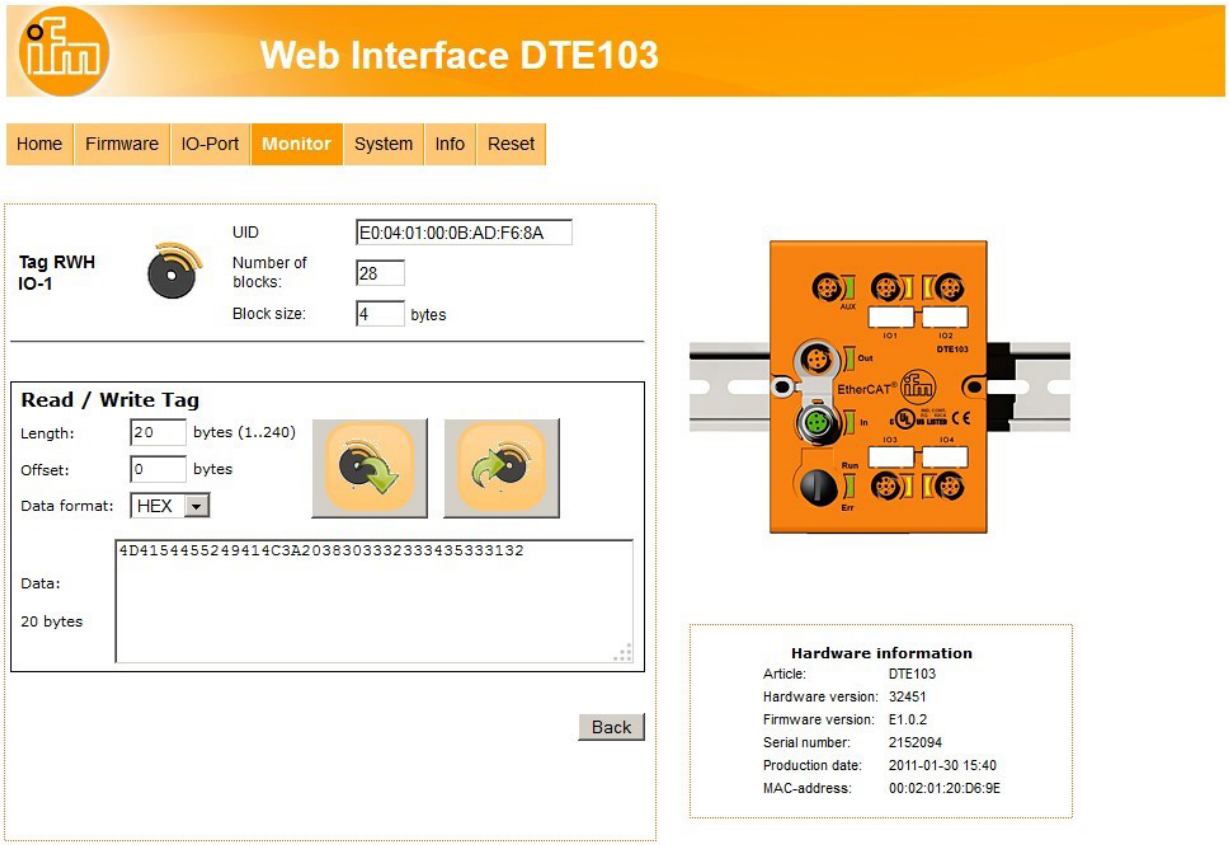
After finishing the firmware update of the read/write head, enter the URL of the evaluation unit to return to the main menu (→ 8 Web server).

8.5.3 Tab "Monitor" -Tag monitoring

This menu allows to:

- read the UID from the RFID tag
- read from or write to the user data area of the RFID tag

8.5.4 Tab "Monitor" - Reading from the RFID tag



The UID data is displayed in real time with an update interval of approximately 0,5 seconds.

► Click  to read from the User data area of the RFID tag.

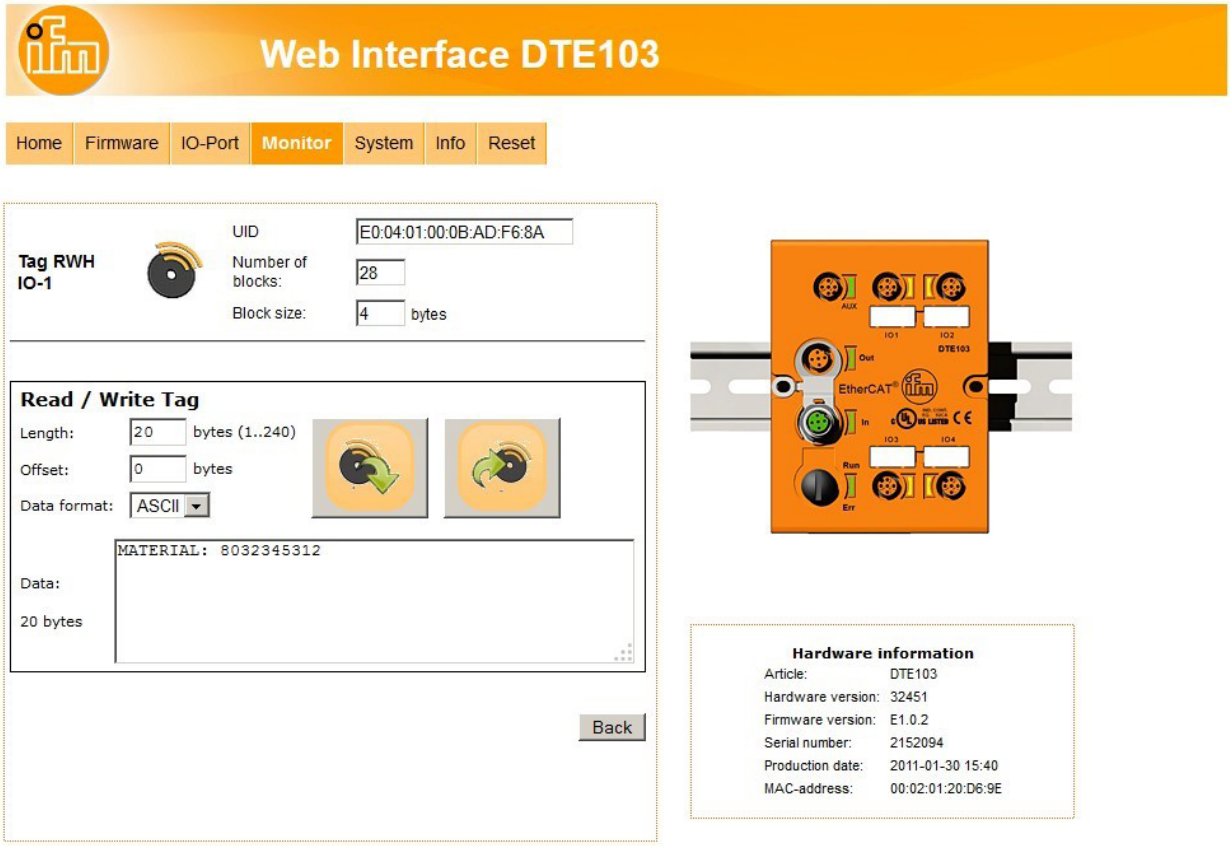
The data length can be set from 1...240 bytes. The address offset can be set from 0 bytes up to the last accessible address of the RFID tag.

► Click [Back] to return to the main menu.

With the selection field „Data format“ the received RFID tag data can be displayed in two formats:

- „HEX“: Data displayed in hexadecimal format.
  Example: „4D4154455249414C3A2038303332333435333132“
- „ASCII“: Data displayed as ASCII character string.
  Example: „MATERIAL: 8032345312“

8.5.5 Tab "Monitor" - Writing to the RFID tag



► Click  to write to the User data area of the RFID tag.

The data length to be written can be set from 1...240 bytes. The address offset can be set from 0 bytes up to the last accessible address of the RFID tag. The data length to be written must correspond to the set number of bytes.

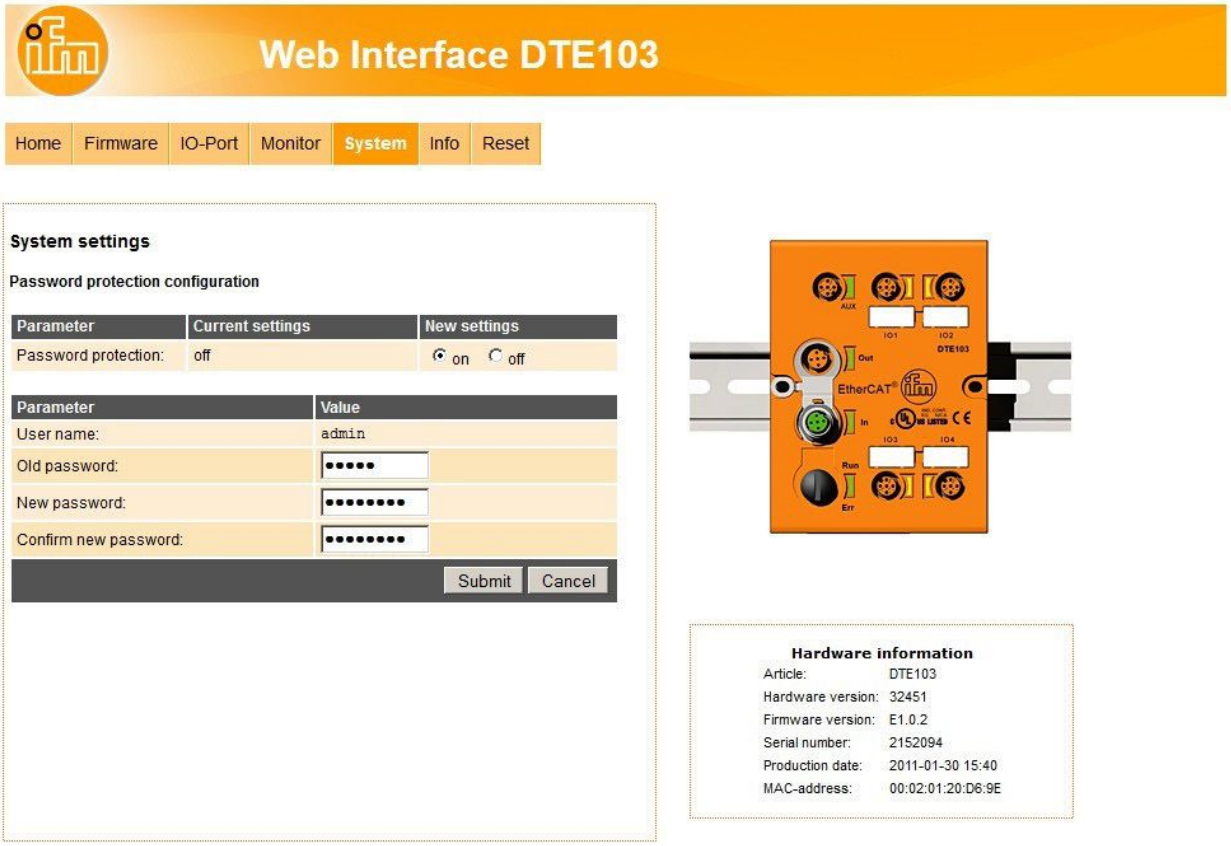
► Click [Back] to return to the main menu.

With the selection field „Data format“ the RFID tag data can be input in two formats:

- „HEX“ : Data input in hexadecimal format.
  Example: „4D4154455249414C3A2038303332333435333132“
- „ASCII“: Data input as ASCII character string.
  Example: „MATERIAL: 8032345312“

The parameter “Length” is automatically calculated.

8.6 Tab "System"



This menu allows to define a password to protect the evaluation unit against unauthorised access.

To enable the password protection the button "New settings" has to be set to "on".

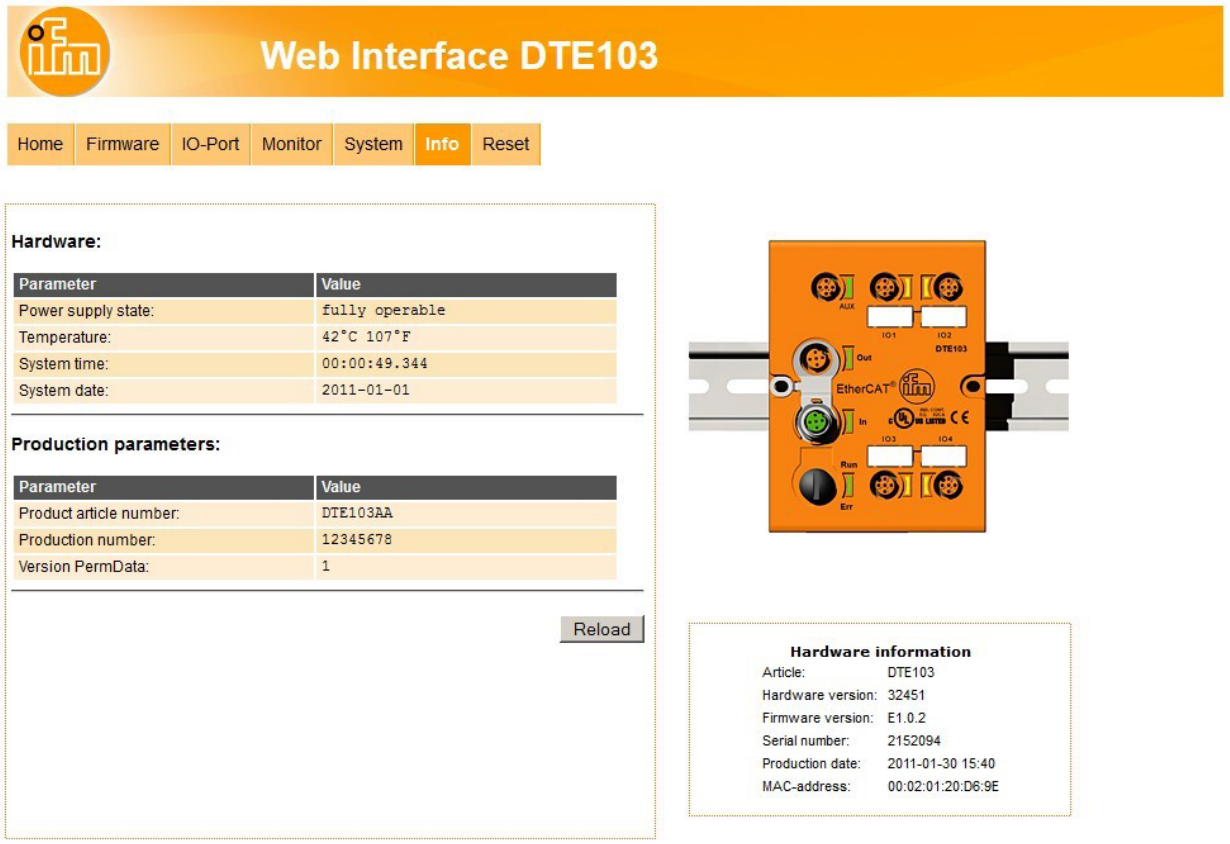
Parameter	Setting	Note
Username	admin	User name could not be changed
Old password	XXXXXX	Default password is "admin"
New password	XXXXXX	Up to 10 characters are allowed
Confirm new password	XXXXXX	Must correspond to the parameter setting "New password"

► Click [Submit] to save the password

► Click [Cancel] to delete all parameter settings

If the password is lost the default password "admin" can be retrieved by a reset to factory settings (→ 6.1 Reset to factory settings).

8.7 Tab "Info"



This menu shows the following information about the evaluation unit:

- Power supply state
- Temperature
- System time
- System date
- Product article number
- Production number
- Version PermData

For a proper operation of the evalution unit the "Power Supply State" should show as "fully operable".

8.8 Tab "Reset"

This menu allows the user to restart the evaluation unit remotely.

If the evaluation unit is restarted, all connections are closed and the outputs are switched off.

To restart the evaluation unit

► check "Please confirm you want to reboot the device"

► Click [submit]

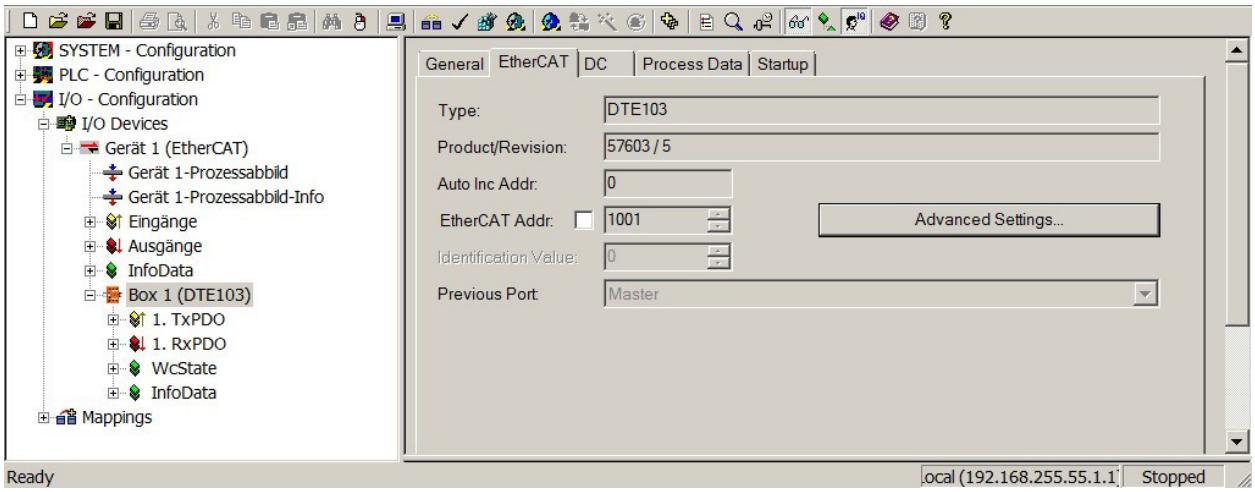
If the evaluation unit does not actualize the Web page, enter the URL of the device in the address line of the Web client to actualize the display.

9 Configuration

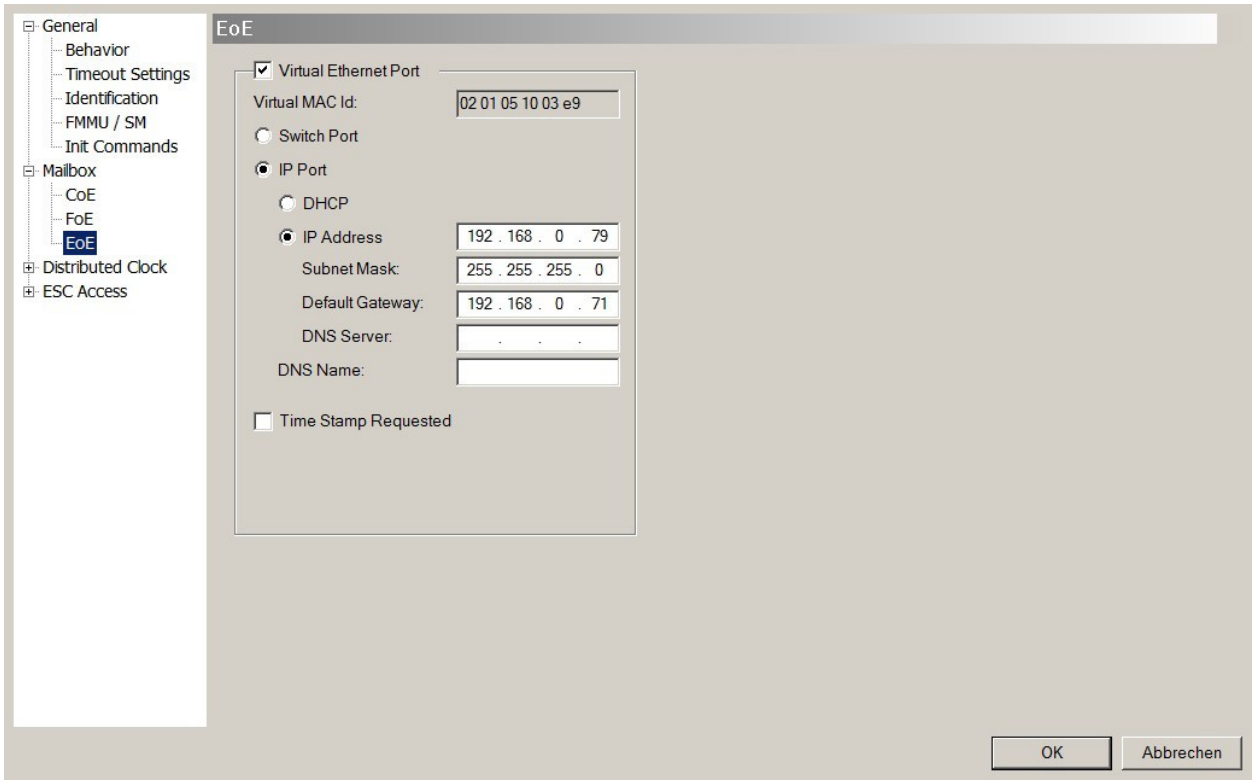
9.1 Parameter setting of the Ethernet interface

The settings of the Ethernet interface are done over the TwinCAT System Manager.

Screenshots are taken from TwinCAT version 2.11.Select “DTE103” and open Tab “EtherCAT”. Click on “Advanced Settings”.



Change to entry “Mailbox” -> “EoE” and setup the parameter for the IP address.



9.2 Determining the MAC address

To determine the MAC adress of the evaluation unit several options are available.

1. Finding the MAC address on the type label

The type lable is located on top of the evaluation unit above the AUX connector.

2. Scanning the MAC address with a data matrix code reader

The code is located on the type label and can be read with any data matrix code scanner.

9.3 Connection concept of the EtherCAT interface

The evaluation unit can be integrated in an EtherCAT network over the connectors "EtherCAT In" and "EtherCAT Out". The integrated EtherCAT switch allows to build a line structure. An external switch is not required. The evaluation unit has only one MAC address, enabling the system to address the evaluation unit with a single IP address. Both Ethernet ports have the same functionality.

9.3.1 Socket connection EtherCAT In and Out

Pin connection of M12 Ethernet socket, D-coded

Signal	Name	Core colour	Pin
TD +	Transmission Data +	White/orange	1
TD -	Transmission Data -	Orange	3
RD +	Receive Data +	White/green	2
RD -	Receive Data -	Green	4
Screen	Shield	-	Housing

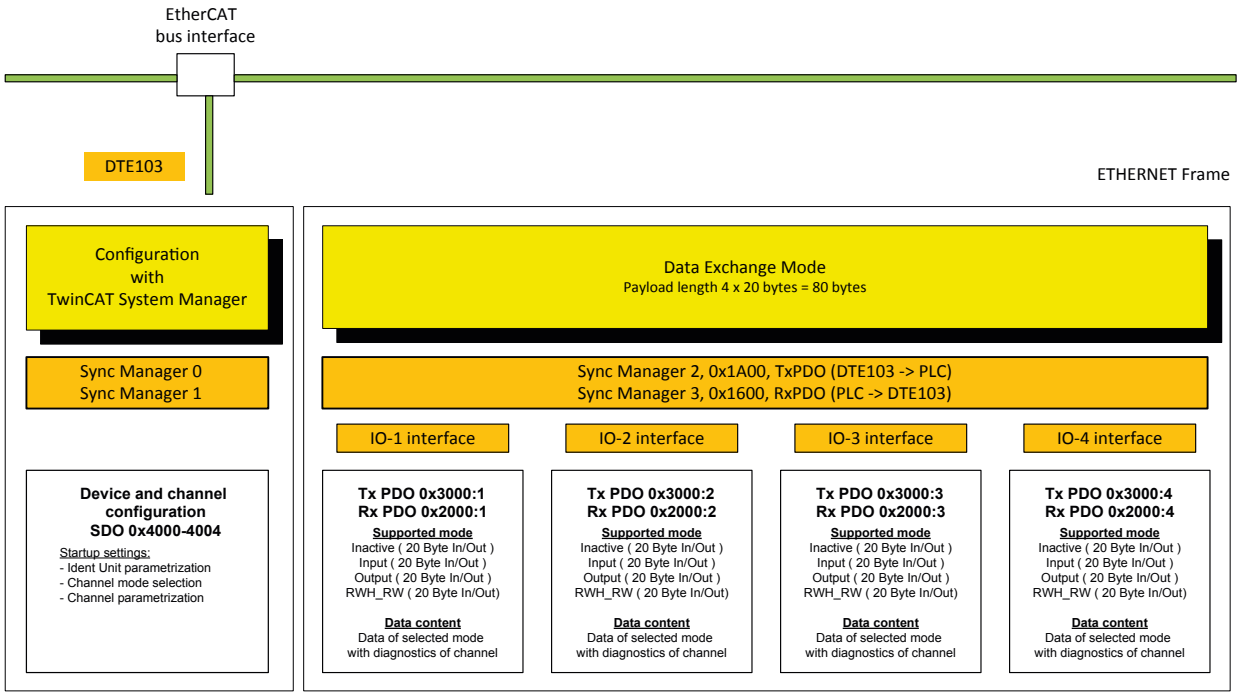
The colours refer to the standard T568B.

9.4 EtherCAT device profile

The device uses the EtherCAT profile “Modular device profile 5001”.

10 PLC process data image

10.1 Address model of the RFID evaluation unit with EtherCAT interface



The configuration data and the process data of the evaluation unit are transferred over the EtherCAT connection. The PLC act as requestor, the evaluation unit as responder.

10.1.1 Process data input image

Each IO channel occupies 20 bytes of the PLC process data input, regardless if it is activated or not. Total size is fixed to 80 bytes.

10.1.2 Process data output image

Each IO channel occupies 20 bytes of the PLC process data output, regardless if it is activated or not. Total size is fixed to 80 bytes

11 Parameter setting

The parameters of the evaluation unit are set via the Startup settings of the device within the TwinCAT System manager. The 4 IO channels of the RFID evaluation unit can be configured depending on the application.

11.1 Device parameters

The device-specific parameters can be set in tab “Startup” of the evaluation unit.

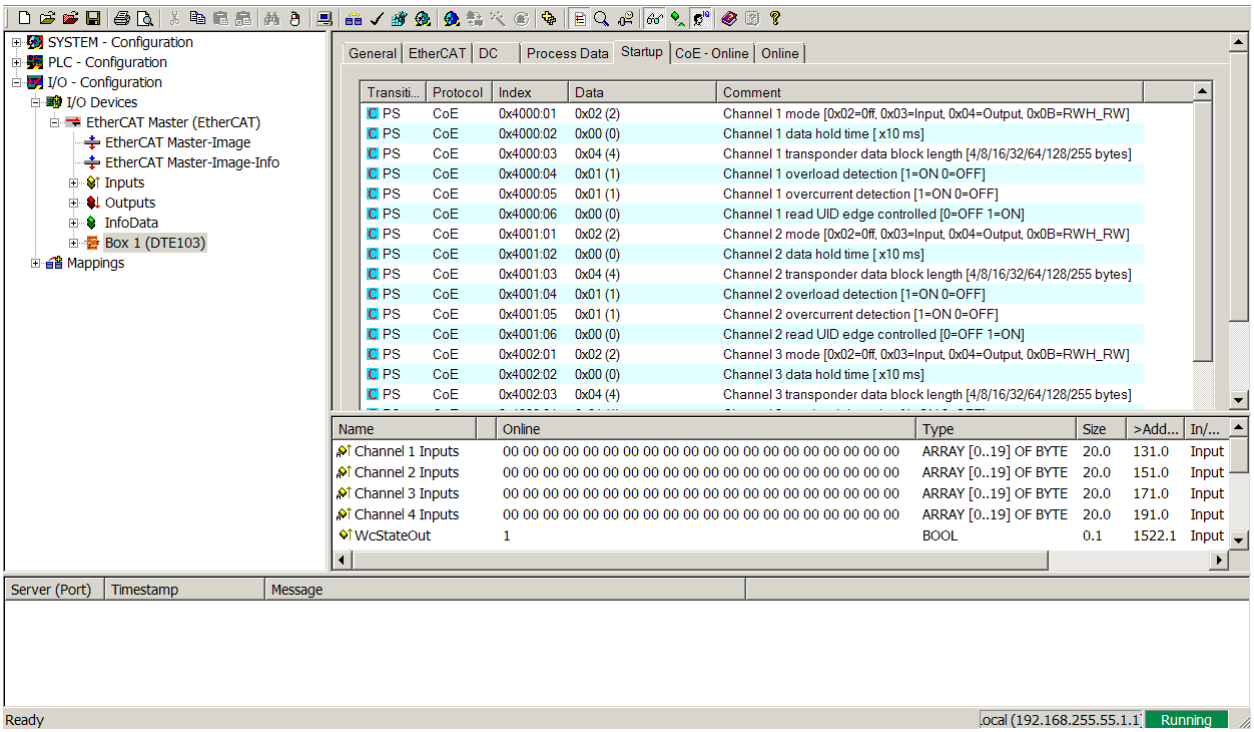
11.1.1 Failsafe mode

Failsafe mode	Description
Off	The IO channel is deactivated if no connection to the EtherCAT controller is established (default).
On	The IO channels remain activated and the outputs keep the state received last if no connection to the EtherCAT controller is established.

Select line “PS CoE 0x4004:01” in tab “Startup” of the device. Enter the requested value.

11.2 Module setting

Each IO-channel can be configured via the Startup settings of the device within the TwinCAT System manager. Select the evaluation unit, here named “Box 1”, and open Tab “Startup”.



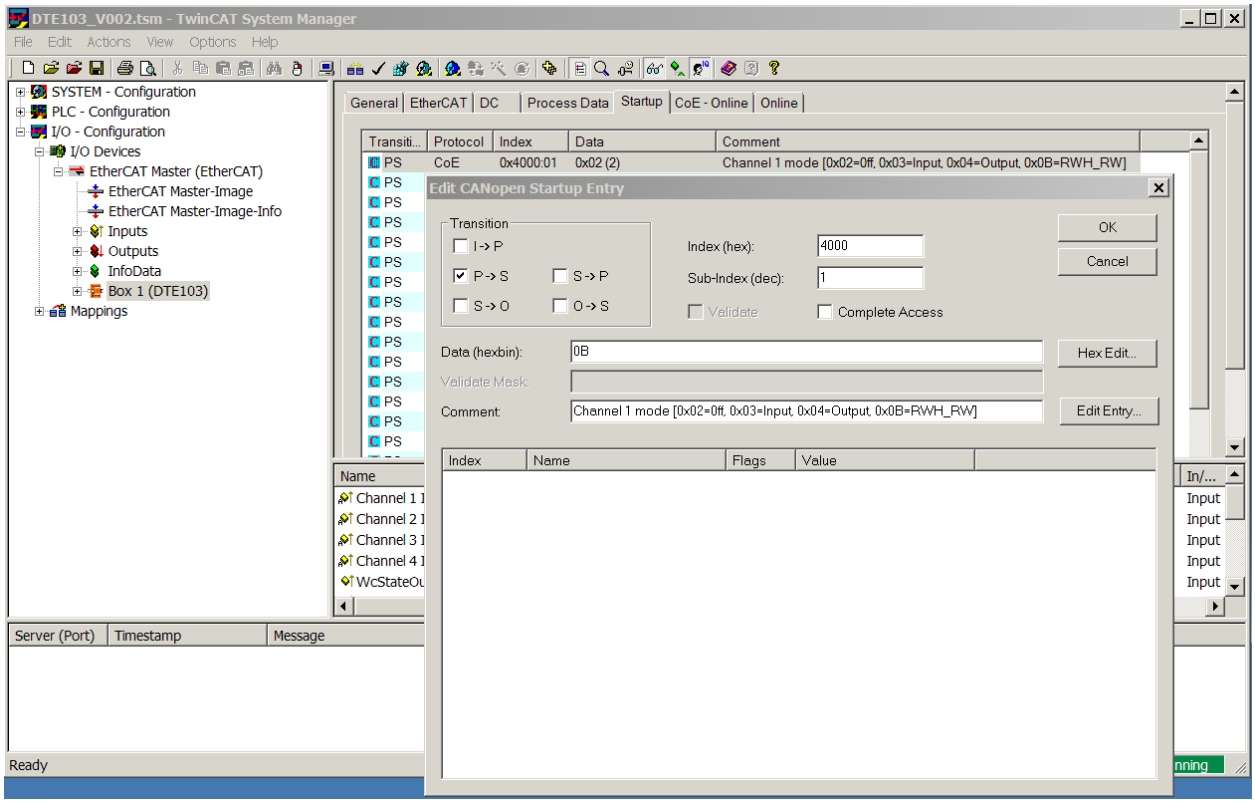
11.3 Module parameters

The parameters of the modules Input, Output and RWH_RW can be set.

11.3.1 Setup “IO-channel mode”

Data [hex]	Module	Description
02	Inactive	Channel off
03	Input	2 IEC 61131 inputs , terminals C/Qi and I/Q
04	Output	1 IEC 61131 output, 1 IEC 61131 input I/Q
0B	RWH_RW	RFID read/write head

Select first line “PS CoE 0x4000:01” in tab “Startup” of the device. Set the IO-channel mode by enter the “CANopen Startup Entry”, field “Data”, of the IO-1 channel.



11.3.2 Setup "Data hold time"

Parameter	Description
Data hold time	Hold time of the UID and User data information of the RFID tag: Unit: (milliseconds *10), 0 ms (default)

The value must be input as hexadecimal number.

Example: For 100 ms the setting shall be “0A”

Parameter valid only for IO-channel mode “Input”, “Output” and “RWH_RW”.

Select line 2 “PS CoE 0x4000:02” in tab “Startup” of the device. Enter the request value.

11.3.3 Setup “Transponder data block length”

Parameter	Description
Transponder data block size	Block size in bytes of the RFID tag: 4/8/16/32/64/128/255 Please refer to the data sheet of the RFID tag for the block size Only necessary for IO-channel mode “RWH_RW”

The value must be input as hexadecimal number.

Example: For 32 byte the setting shall be “20”

Select line 3 “PS CoE 0x4000:03” in tab “Startup” of the device. Enter the requested value.

11.3.4 Setup “Overload and Overcurrent detection”

With the parameter “Overload detection” the output current at terminal L+ can be controlled.

With the parameter “Overcurrent detection” the output current at terminal C/Qo can be controlled.

Parameter	Description
Overload detection	On: Overload on terminal L+ of the IO-port is supervised (default) The output current is limited to 500...700 mA Off: Supervision is off The output current is not supervised and may increase up to 1200 mA. In this case the output driver of the IO-channel is protect against overtemperature.
Overcurrent detection	On: Overcurrent on terminal C/Qo of the IO-port is supervised (default) The output current is limited to 500 mA Off: Supervision is off The output current is not supervised and may increase up to 600 mA. In this case the output driver of the IO-channel is protect against overtemperature.

Select line 4 and 5 with “PS CoE 0x4000:04” and “PS CoE 0x4000:05” in tab “Startup” of the device. Enter the requested value.

The maximum current consumption at terminal AUX + / AUX - may not exceed 3 A.

11.3.5 Setup “Read UID edge controlled”

If the UID of the RFID tag shall be read only when a “Read UID” command is started than the value shall be set to “01”. (Activate synchronous mode)

If the UID of the RFID tag shall be read continuously without sending a command from the EtherCAT master the value “00” shall be used. (Activate asynchronous mode)

Parameter valid only for IO-channel mode “RWH_RW”

Parameter	Description
UID edge controlled	Edge-controlled reading of the UID via bit RD in the control word of the module RWH_RW Default: Off

Select line 6 with “PS CoE 0x4000:06” in tab “Startup” of the device. Enter the requested value.

Repeat the setup for all used IO-channels.

12 Module description

The following functions are available:

- Detection if an RFID tag is in front of the read/write head.
- Control of read/write head to switch on or off the RFID antenna field.
- Read of the Unique Identifier number (UID) of the RFID tag.
- Read of the User data of the RFID tag.
  Reading started via control bit “RD”. Maximum read length with one command is 16 bytes. (1)
- Write to the User data of the RFID tag.
  Writing started via control bit “WR”. Maximum write length with one command is 16 bytes. (1)
- Write verified to the User data of the RFID tag.
  Writing verified started via control bit “WR” and "RD". Maximum write length with one command is 16 bytes. (1)
- Simple diagnostics of the IO-x channels of the evaluation unit.
- Simple notification of evaluation unit diagnostics.
- Remote restart of the evaluation unit

(1) If more data than 16 bytes had to be read or written, the user must repeat the command with changed offset parameter.

Module name	Description	Remark
Inactive (20 Byte In/Out)	Cyclic transmission	High impedance
Input (20 Byte In/Out)	Cyclic transmission	IEC61131 Input
Output (20 Byte In/Out)	Cyclic transmission	IEC61131 Output
RWH_RW (20 Byte In/Out)	Cyclic command channel	Command channel

The PLC input data image and output data image has a size of 4 x 20 bytes = 80 bytes.

12.1 Module “Inactive”

This module allows the user to:

- switch off an unused process interface IO-1 … IO-4
- read the diagnostic information of the evaluation unit

PLC process data output image (Module Inactive)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	**DR**	0	0	0	0	0	0
2	0x00							
3	0x00							
,,	..							
19	0x00							
20	0x00							

Description byte 1, “Control byte”:

Bit	Value	Description	Remark
DR (1)	0	No read request	Data byte 2 … 20 of the PLC process data input image is set to 0x00.
	0 -> 1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the diagnostics response is available.

(1) Diagnostics is only available, if bit “Diag” within the response data is set.

Description Byte 2…20:

Not used. Should be set to 0x00 within the PLC process data output image.

PLC process data input image (Module Inactive)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	0	0	0	0	0	0
2	0x00 / Number of diagnostic events							
3	0x00 / Error code byte 1							
4	0x00 / Error code byte 2							
5	0x00 / Error code byte 3							
6	0x00 / Error code byte 4							
..	..							
20	Not used							

Description byte 1, “Status byte”:

Bit	Value	Description	Remark
DR-RDY	0	Reading not started or evaluation unit diagnostics data not ready	-
	1	Diagnostics read ready	Diagnostics read response from evaluation unit is ready and available in byte 2 … n.
Diag	0	No diagnostics available	-
	1	evaluation unit diagnostics occurred	Data not yet written in the response buffer. The response buffer contains still default values 0x00. The diagnostics data will be copied in the response buffer, after detecting that the DR control bit.is set within the control byte.

Description Byte 2, ”Number of diagnostic events”:

Number of diagnostic events.

(0 = No diagnostics, 1…4 = 1…4 diagnostics event(s))

Description Byte 3…n:

If bit “DR-RDY” within the Status byte is set these bytes contain the error codes of the evaluation unit. Otherwise these bytes are set to default value 0x00 by the evaluation unit.

If more than one diagnostics event is available this is appended. Up to 4 diagnostics messages could be transferred. Error codes see (→ 14 Error codes of the evaluation unit).

Description Byte (n+1)…20:

Will be set to default value 0x00 by the evaluation unit.

12.2 Module “Input”

This module allows the user to

- read the binary inputs of the process interface IO-1 … IO-4.
- read the diagnostic information of the evaluation unit.

PLC process data output image (Module Input)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	**DR**	0	0	0	0	0	0
2	0x00							
3	0x00							
,,	..							
19	0x00							
20	0x00							

Description byte 1, “Control byte”:

Bit	Value	Description	Remark
DR (1)	0	No read request	Data byte 2 … 20 of the PLC process data input image is set to 0x00.
	0 -> 1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the diagnostics response is available.

(1) Diagnostics is only available, if bit “Diag” within the response data is set.

Description Byte 2…20:

Not used. Should be set to 0x00 within the PLC process data output image.

PLC process data input image (Module Input)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	DR-RDY	0	0	OL	0	I/Q	C/Qi
2	0x00 / Number of diagnostic events							
3	0x00 / Error code byte 1							
4	0x00 / Error code byte 2							
5	0x00 / Error code byte 3							
6	0x00 / Error code byte 4							
..	…							
20	Not used							

Description byte 1, “Status byte”:

Bit	Value	Description	Remark
C/Qi	0	Input at C/Qi < 8 V	The level of C/Qi is measured by hardware
	1	Input at C/Qi > 11 V	The level of C/Qi is measured by hardware
I/Q	0	Input I/Q < 8 V	The level of I/Q is measured by hardware
	1	Input I/Q > 11 V	The level of I/Q is measured by hardware
OL	0	L+ o.k.	Set by hardware
	1	Overload on L+	Set by hardware
DR-RDY	0	Reading not started or evaluation unit diagnostics data not ready	-
	1	Diagnostics read ready	Diagnostics read response from evaluation unit is ready and available in byte 2 … 5.
Diag	0	No diagnostics available.	-
	1	evaluation unit diagnostics occurred	Data not yet written in the response buffer. The response buffer contains still default values 0x00. The diagnostics data will be copied in the response buffer, after detecting that the DR control bit.is set within the control byte.

Description Byte 2, ”Number of diagnostic events”:

Number of diagnostic events.

(0 = No diagnostics, 1…4 = 1…4 diagnostics event(s))

Description Byte 3…n:

If bit “DR-RDY” within the Status byte is set these bytes contain the error codes of the evaluation unit. Otherwise these bytes are set to default value 0x00 by the evaluation unit.

If more than one diagnostics event is available this is appended. Up to 4 diagnostics messages could be transferred. Error codes see chapter 14.

Description Byte (n+1)…20:

Will be set to default value 0x00 by the evaluation unit.

12.3 Module “Output”

This module allows the user to

- read the binary inputs of the process interface IO-1 … IO-4.
- write to binary outputs of the process interface IO-1 … IO-4.
- read the diagnostic information of the evaluation unit.

PLC process data output image (Module Output)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	**DR**	0	0	0	HC	0	C/Qo
2	0x00							
3	0x00							
,,	…							
19	0x00							
20	0x00							

Description byte 1, “Control byte”:

Bit	Value	Description	Remark
C/Qo	0	Drive output at C/Qo low	-
	1	Drive output at C/Qo high	-
HC	0	Allow lowside and highside output current of max. 0.5A at C/Qo	Bit HC only valid on channel IO-3 and channel IO-4. (Output driver is in Push/Pull mode)
	1	Allow highside output current of max. 1A at C/Qo	Bit HC only valid on channel IO-3 and channel IO-4. (Output driver is in Push mode)
DR (1)	0	No read request	Data byte 2 … 20 of the PLC process data input image is set to 0x00.
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the diagnostics response is available.

(1) Diagnostics is only available, if bit “Diag” within the response data is set.

Description Byte 2…20:

Not used. Should be set to 0x00 within the PLC process data output image.

PLC process data input image (Module Output)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	DR-RDY	0	0	OL	HC	I/Q	C/Qi
2	0x00 / Number of diagnostic events							
3	0x00 / Error code byte 1							
4	0x00 / Error code byte 2							
5	0x00 / Error code byte 3							
6	0x00 / Error code byte 4							
..	…							
20	Not used							

Description byte 1, “Status byte”:

Bit	Value	Description	Remark
C/Qi	0	Level at C/Qo = L	The level of C/Qi is not measured, but taken from the output value C/Qo
	1	Level at C/Qo = H	The level of C/Qi is not measured, but taken from the output value C/Qo
I/Q	0	Input I/Q < 8V	The level of I/Q is measured by hardware
	1	Input I/Q > 11V	The level of I/Q is measured by hardware
HC	0	Current of max. 0.5A enabled at C/Qo	-
	1	Current of max. 1A enabled at C/Qo	Only valid on channel IO-3 and IO-4
OL	0	L+ o.k.	Set by hardware
	1	Overload on L+	Set by hardware
DR-RDY	0	Reading not started or evaluation unit diagnostics data not ready	-
	1	Diagnostics read ready	Diagnostics read response from evaluation unit is ready and available in byte 2 … 5.
Diag	0	No diagnostics available.	-
	1	evaluation unit diagnostics occurred	Data not yet written in the response buffer. The response buffer contains still default values 0x00. The diagnostics data will be copied in the response buffer, after detecting that the DR control bit.is set within the control byte.

Description Byte 2, ”Number of diagnostic events”:

Number of diagnostic events.

(0 = No diagnostics, 1…4 = 1…4 diagnostics event(s))

Description Byte 3…n:

If bit “DR-RDY” within the Status byte is set these bytes contain the error codes of the evaluation unit. Otherwise these bytes are set to default value 0x00 by the evaluation unit.

If more than one diagnostics event is available this is appended. Up to 4 diagnostics messages could be transferred. Error codes see chapter 14.

Description Byte (n+1)…20:

Will be set to default value 0x00 by the evaluation unit.

12.4 Module “RWH_RW”, general description

This module allows the user to

- read the UID of the RFID tag over the read/write head at process interface IO-1 … IO-4. Two different modes are available:
  - Read UID once on request (Synchronous mode).
  - Read UID automatically whenever the evaluation unit detect a change of the UID data (Asynchronous mode).

- read the User data of the RFID tag over the read/write head at process interface IO-1 … IO-4. Two different modes are available:
  - Read User data of the RFID tag once on request (Synchronous mode).
  - Read User data of the RFID tag automatically whenever the evaluation unit detect a change of the UID data (Asynchronous mode).

- Write to the User data of the RFID tag over the read/write head at process interface IO-1 … IO-4.
- Write verified to the User data of the RFID tag.
- Read the diagnostic information of the evaluation unit.
- Switch off and on the antenna field of the read/write head

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Res	**DR**	ER	UR	RD	WR	AO	Res
2	Data byte 1							
3	Data byte 2							
,,	…							
19	Data byte 18							
20	Data byte 19							

Description Byte 1, “Control byte”:

Bit	Bit name	Description
0	Res	Reserved
1	AO	„Antenna field Off“ request
2	WR	WRite data to the User data of the RFID tag
3	RD	ReaD data from the User data of the RFID tag
4	UR	Mode “Access to the UseR data of the RFID tag”
5	ER	Mode “Event controlled Reading of User memory of the RFID tag”
6	DR	evaluation unit Diagnostics Read, set by the controller to fetch the diagnostics, signaled by the evaluation unit in the Diag status bit
7	Res	Reserved

Remark:

The bits WR, RD, DR are edge controlled bits. The change from state “0->1” activates the command request. The state “1” forces the evaluation unit to hold the response data or to execute the command automatically. The state “0” forces the evaluation unit to set the data within the Process data input image from Byte 2…20 to default value “0x00”.

It is not allowed to the set bit DR with the bits WR or RD or ER simultaneously, because the module can handle only one command request. Otherwise an error message is created (Diag bit = 1).

Description Byte 2…20, ”Data byte 1…19”:

Dependent on the selected mode this data memory contains command data to send to the evaluation unit.

Default value “Control byte”: 0x00

Mode: Read UID automatically, antenna field on

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	DIAG	**DR-RDY**	EA	UD	RD-RDY	WR-RDY	AI	TP
2	Data byte 1							
3	Data byte 2							
..	…							
19	Data byte 18							
20	Data byte 19							

Description Byte 1, “Status byte”:

Bit	Bit name	Description
0	TP	RFID tag Present
1	AI	Antenna field Inactive
2	WR-RDY	WRite to User data of the RFID tag ReaDY
3	RD-RDY	ReaD from the User data of the RFID tag ReaDY
4	UD	Mode “Access to the User Data of the RFID tag” active
5	EA	Mode “Receive User data on Event change Active”
6	DR-RDY	Diagnostics Read response ReaDY and available in the response buffer. Coding: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
7	DIAG	Evaluation unit DIAGnostics occurred, but not yet written in the response buffer. The response buffer contains still RFID tag data. The diagnostics data will be copied in the response buffer, after detecting that the DR control bit is set by the controller.

Description Byte 2…20, ”Data byte 1…19”:

Dependent on the selected mode this data memory contains the response data read from the evaluation unit or the diagnostics information.

12.5 Module “RWH_RW”, Read UID of the RFID tag synchronously

In this mode the UID of the RFID tag can be read once by setting the bit RD from 0 to 1. This mode is suitable if the user knows when the RFID tag is present in front of the read/write head. The read UID is kept in the data bytes 2…18 stable while bit RD is set to 1.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (2)	0	0	RD (1)	0	AO=0	0
2	Not used							
,,	..							
20	Not used							

Description byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request	Activate the antenna field
RD (1)	0	UID no read request	UID length/data is cleared in data bytes 2…20 of the PLC process data input
	0->1	Edge: UID read request	Starts the reading of the UID.
	1	UID hold request	RD must be kept on 1 until the command response is available. The UID length/data is transmitted in data byte 2…20 of the PLC process data input.
DR (2)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available

(1) Bit RD is only evaluated if the channel parameter “UID edge controlled” is set. Otherwise the UID will be read continuously regardless of the setting of bit RD.

(2) Diagnostics is only available, if bit “Diag” within the response data is set. Otherwise the response data will return default data “0x00” within byte 2...20. The setting of bit DR to 1 is only allowed when bit RD is set to 0.

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	0	0	RD-RDY	0	AI=0	TP
2	UID data length read							
3	UID data byte 1 (MSBy)							
4	UID data byte 2							
,,	...							
18	UID data byte 16							
19	0x00							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/ write head	-
	1	RFID tag is detected in front of the read/ write head	Bit is set to 1 as long as the RFID tag is detected by the Read/write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
RD-RDY	0	No read request started or read request not ready	Data in Byte 2 … 18 is set to default values 0x00
	1	Read request from evaluation unit ready	Data in Byte 2 … 18 valid.
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	-

Description Byte 2, ”UID data length read”:

UID data length read. Data length of the UID read from RFID tag [bytes].

Remark: If no RFID tag is detected by the read/write head this byte is set to 0x00.

Description Byte 3 … 6/10/14/18, ”UID data byte”:

Read UID of the RFID tag with length of 32/64/96/128 bit. Unused bytes are set to 0x00. If no RFID tag is detected by the read/write head this data field is set to 0x00.

Description Byte 19 … 20:

Always set to 0x00.

12.6 Module “RWH_RW”, Read UID of the RFID tag asynchronously

In this mode the UID of the RFID tag can be read automatically without sending any read request. This mode is suitable if the user do not know when the RFID tag is present in front of the read/write head. Additionally this mode allow the fastest detection of RFID tag cause no command request need to be send to the evaluation unit. Please note that the UID is transmitted in real time and the PLC cycle time need to be about factor 2 shorter as the RFID tag is detected by the read/write head.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (1)	0	0	0	0	AO=0	0
2	Not used							
,,	..							
20	Not used							

Description byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request	Activate the antenna field
DR (1)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available

(1) Reading of the diagnostics is only possible if ER is set to 0. Diagnostics is only available, if bit “Diag” within the response data is set. Otherwise the response data will return default data “0x00” within byte 2...20 of the response data.

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	0	0	0	0	AI=0	TP
2	UID data length read							
3	UID data byte 1 (MSBy)							
4	UID data byte 2							
,,	...							
18	UID data byte 16							
19	0x00							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/ write head	-
	1	RFID tag is detected in front of the read/ write head	Bit is set to 1 as long as the RFID tag is detected by the Read/write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	-

Description Byte 2, ”UID data length read”:

Data length of the UID read from the RFID tag [bytes].

Remark: If no RFID tag is detected by the read/write head this byte is set to 0x00. The data length is held according to the setting of the channel parameter “Data Hold Time”

Description Byte 3 … 6/10/14/18, ”UID data byte”:

Read UID of the RFID tag with length of 32/64/96/128 bit. Unused bytes are set to 0x00. If no RFID tag is detected by the read/write head this data field is set to 0x00.

Remark: . UID data bytes are held according to the setting of the channel parameter “Data Hold Time”

Description Byte 19 … 20:

Always set to 0x00.

12.7 Module “RWH_RW”, Read User data of the RFID tag synchronously

In this mode the User data of the RFID tag can be read edge controlled by setting the bit RD from 0 to 1. This mode is suitable if the user know when the RFID tag is present in front of the read/write head. The read User data is kept in the data bytes 2…18 stable while bit RD is set to 1.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (3)	ER=0	UR=1 (1)	RD (2)	0	AO=0	0
2	Read data length							
3	16 bit start address [D15…D8]							
4	16 bit start address [D7…D0]							
5	Not used							
,,								
20	Not used							

Description Byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request inactive	Activate the antenna field.
RD (2)	0	No read request of User data	User data length/data is cleared in data byte 2…20 of the PLC process data input image.
	0->1	edge: User data read request	Starts the reading of the User data.
	1	User data hold request	RD must be kept on 1 until the command response is available. The User data length/data is transmitted in data byte 2…20 of the PLC process data input image.
UR (1)	1	Mode “User data” selected	Must be set to 1 to access the User data of the RFID tag
ER	0	Mode “Read user data synchronously” selected	Must be set to 0 for reading the User data synchronously
DR (3)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00.
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available.

(1) Mode can be changed every time if bit “RD” and “DR” is set to 0 => no command active.

(2) A simultaneously activation of bit DR and RD is not allowed!

(3) Reading of the diagnostics is only possible if bit RD is set to 0. Diagnostics is only available, if bit “Diag” within the response data is set. Otherwise the response data will return default data “0x00” within byte 2...20 of the response data.

Description Byte 2, ”Read data length”:

Read data length, limited to a maximum number of 16 bytes.

Description Byte 3... 4, ”16 bit start address”:

Start address of the RFID tag User data where the data has to be read from.

Description Byte 5... 20, ”Not used ”:

These bytes are ignored.

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	EA=0	UD=1	RD-RDY	0	AI	TP
2	Read data length							
3	Read data byte 1							
4	Read data byte 2							
,,	...							
18	Read data byte 16							
19	0x00							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/write head	-
	1	RFID tag is detected in front of the read/ write head	Bit is set to 1 as long as the RFID tag is detected by the Read/write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
	1	“Antenna field off” request active	-
RD-RDY	0	No command request detected or command execution active	Read length / Read data byte is cleared in data byte 2…17 of the PLC process data input image.
	1	Command execution is ready.	Diag bit is not set: Command execution ok. Read length / Read data byte is set in data byte 2…17 of the PLC process data input image. Diag bit is set: Command execution not ok. Read length / Read data bytes are set to zero.
UD	1	Mode “Read/write used data of the RFID tag” active	Feedback of the selected mode.
EA	0	Mode “Receive User data of the RFID tag on request” active	Feedback of the selected mode.
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	Maybe channel related or channel independent error occurred.

Description Byte 2, ”Read data length”:

Read data length

Description Byte 3... 20, ”Read data byte 1 … 16”:

In mode “User data” this data area contains the data of the User data of the RFID tag. Unused bytes are set to 0x00.

In read diagnostics mode this data area contains detailed error codes.

12.8 Module “RWH_RW”, Read User data of the RFID tag asynchronously

In this mode the User data of the RFID tag can be read automatically without sending any read request. This mode is suitable if the user know when the RFID tag is present in front of the read/write head. Additionally this mode allow the fastest detection of RFID tag cause no command request need to be send to the evaluation unit. Please note that the User data is transmitted in real time and the PLC cycle time need to be about factor 2 shorter as the RFID tag is detected by the read/write head.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (3)	ER=1 (2)	UR=1 (1)	RD=1 (2)	0	AO=0	0
2	Read data length							
3	16 bit start address [D15…D8]							
4	16 bit start address [D7…D0]							
5	Not used							
,,								
20	Not used							

Description Byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request inactive	Activate the antenna field
RD (2) UR (1) ER (2)	1	Mode “Receive User data automatically” selected	(1) Must be set to 1 to access the User data of the RFID tag
DR (3)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00.
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available.

(1) Mode can be changed every time if bit “RD”, “ER” and “DR” is set to 0 => no command active.

(2) If bit ER and bit RD is set to 1 a reading process of the User data of the RFID tag is started when a change of the bit TP is detected. So the user gets only a message from the evaluation unit if the state of the RFID tag changes from “not present to present” and from “present to not present”. This help to limit the requests which are needed to be send from the PLC.

(3) Reading of the diagnostics is only possible if ER und RD is set to 0. Diagnostics is only available, if bit “Diag” within the response data is set. Otherwise the response data will return default data “0x00” within byte 2...20 of the response data.

Description Byte 2, ”Read data length”:

Read data length, limited to a maximum number of 16 bytes.

Description Byte 3... 4, ”16 bit start address”:

Start address of the RFID tag User data where the data has to be read from.

Description Byte 5... 20, ”Not used ”:

These bytes are ignored.

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	EA	UD=1	RD-RDY	0	AI	TP
2	Read data length							
3	Read data byte 1							
4	Read data byte 2							
,,	...							
18	Read data byte 16							
19	0x00							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/write head	-
	1	RFID tag is detected in front of the read/write head	Bit is set to 1 as long as the RFID tag is detected by the Read/ write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
	1	“Antenna field off” request active	-
RD-RDY	0	No command request detected or command execution active	Read length / Read data byte is cleared in data byte 2…17 of the PLC process data input image.
	1	Command execution is ready.	Diag bit is not set: Command execution ok. Read length / Read data byte is set in data byte 2…17 of the PLC process data input image. Diag bit is set: Command execution not ok. Read length / Read data bytes are set to zero.
UD	1	Mode “Read/write used data of the RFID tag” active	Feedback of the selected mode.
EA	0	Mode “Receive User data of the RFID tag on request” active	-
	1	Mode “Message controlled reception of the User data of the RFID tag” actives	-
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	Maybe channel related or channel independent error occurred.

Description Byte 2, ”Read data length”:

Read data length.

The data length is held according to the setting of the channel parameter “Data Hold Time”.

Description Byte 3... 20, ”Read data byte 1 … 16”:

This data area contains the data of the User data of the RFID tag. Unused bytes are set to 0x00.

In read diagnostics mode this data area contains detailed error codes.

The User data are held according to the setting of the channel parameter “Data Hold Time”.

12.9 Module “RWH_RW”, Write User data of the RFID tag

In this mode the User data of the RFID tag can be written.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (3)	0	UR=1 (1)	0	WR (2)	AO=0	0
2	Write data length							
3	16 bit start address [D15…D8]							
4	16 bit start address [D7…D0]							
5	Write data byte 1							
,,	..							
20	Write data byte 16							

Description Byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request active	Activate the antenna field.
WR (2)	0	No write request	-
	0->1	Write “user data to the RFID tag” request	Data byte 5 … 20 is written to the User data of the RFID tag.
	1	Write request active	WR must be kept on 1 until the command response is available.
UR (1)	1	Mode “User data” selected	Must be set to 1 to access the User data of the RFID tag
DR (3)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00.
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available.

(1) Mode can be changed every time if bit DR, WR = 0 (no command active.)

(2) A simultaneously activation of bit DR and WR is not allowed!

(3) Diagnostics is only available, if bit “Diag” within the response data is set. A simultaneously activation of bit DR with bit WR not allowed! Otherwise the evaluation unit will return default data “0x00” within byte 2...20 of the response data.

Description Byte 2, ”Write data length”:

Write data length, limited to a maximum number of 16 bytes.

Description Byte 3... 4, ”16 bit start address”:

Start address of the RFID tag User data where the data has to be written to.

Description Byte 5... 20, ”Write data byte”:

In write mode the data to be written has to be copied in this data area. (Write data bytes 1 … 16)

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	0	UD=1	0	WR-RDY	AI	TP
2	Write data length							
3	0x00							
,,	...							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/ write head	-
	1	RFID tag is detected in front of the read/ write head	Bit is set to 1 as long as the RFID tag is detected by the Read/write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
	1	“Antenna field off” request active	-
WR-RDY	0	No command request detected or command execution active or error occurred.	-
	1	Command execution is ready.	-
UD	1	Mode “Write User data to the RFID tag” active	Feedback of the selected mode.
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	Maybe channel related or channel independent error occurred.

Description Byte 2, ”Write data length”:

Write data length. If the write data length matches to the write data length in the command response and bit Diag is set to 0 the write process could be finished without failure.

Description Byte 3... 20:

In write mode this bytes are set 0x00.

In read diagnostics mode this data area contains detailed error codes.

12.10 Module “RWH_RW”, Write verified User data of the RFID tag

In this mode the User data of the RFID tag can be written and read back with one command request.

In the first step the command data is written to the RFID tag, in the second step it is read back from the RFID tag. In the third step the evaluation unit compares the written data with the read data and sends back the result to the PLC.

PLC process data output image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	0	DR (3)	0	UR=1 (1)	RD (2)	WR (2)	AO=0	0
2	Write data length							
3	16 bit start address [D15…D8]							
4	16 bit start address [D7…D0]							
5	Write data byte 1							
,,	..							
20	Write data byte 16							

Description Byte 1, “Control byte”:

Bit	Value	Description	Remark
AO	0	“Antenna field on” request active	Activate the antenna field.
WR (2) RD (2)	0	No write verified request active	Data byte 2 … 20 of the process data input image is set to 0x00.
	0->1	Write verified to the “user data of the RFID tag” request	Data byte 5 … 20 are written to the User data of the RFID tag. Afterwards the data bytes are read back from the RFID tag.
	1	Write verified request active	WR must be kept on 1 until the command response is available.
UR (1)	1	Mode “User data” selected	Must be set to 1 to access the User data of the RFID tag
DR (3)	0	No read request	Data byte 2 … 20 of the process data input image is set to 0x00.
	0->1	Read diagnostics of the evaluation unit	-
	1	Diagnostics read request active	DR must be kept on 1 until the command response is available.

(1) Mode can be changed every time if bit DR, WR = 0 (no command active.)

(2) Bits WR and RD must be set simultaneously in the command request.

(3) Diagnostics is only available, if bit “Diag” within the response data is set. A simultaneously activation of bit DR with bits WR and RD is not allowed! Otherwise the evaluation unit will return default data “0x00” within byte 2...20 of the response data.

Description Byte 2, ”Write data length”:

Write data length, limited to a maximum number of 16 bytes.

Description Byte 3... 4, ”16 bit start address”:

Start address of the RFID tag User data where the data has to be written to.

Description Byte 5... 20, ”Write data byte”:

In write mode the data to be written has to be copied in this data area. (Write data bytes 1 … 16)

PLC process data input image (Module RWH_RW)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	Diag	**DR-RDY**	0	UD=1	RD-RDY	WR-RDY	AI	TP
2	Write data length							
3	0x00							
,,	...							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
TP	0	No RFID tag detected in front of the read/ write head	-
	1	RFID tag is detected in front of the read/ write head	Bit is set to 1 as long as the RFID tag is detected by the Read/write head. With the channel parameter “data hold time” the status of the bit can be extended.
AI	0	“Antenna field on” request active	-
	1	“Antenna field off” request active	-
WR-RDY RD-RDY	0	No command request detected or command execution active.	-
	1	Command execution is ready.	Result of the comparison is given back in byte 2.
UD	1	Mode “Write User data of the RFID tag” active	Feedback of the selected mode.
DR-RDY	0	No diagnostic read request or diagnostic data not ready.	-
	1	Diagnostics read request from evaluation unit ready.	Error code: Byte 2: Number of diagnostic events Byte 3-6: Diagnostic message 1 Byte 7..10: Diagnostic message 2 Byte 11..14: Diagnostic message 3 Byte 15..18: Diagnostic message 4
Diag	0	No error detected	-
	1	evaluation unit diagnostics available	Maybe channel related or channel independent error occurred.

Description Byte 2, ”Read data length”:

If the comparison of the written and read data is successful the read data length is identical to the write data length.

Description Byte 3... 20:

These bytes contain the User data read back from the RFID tag.

In read diagnostics mode this data area contains detailed error codes.

12.11 Restart of the evaluation unit

The evaluation unit can be remotely restarted.

The device shut off the fieldbus interface and the IO ports and execute than a power on cycle.

The command can be executed in all modules.

The control and status byte must have value 0x0 before the command is started.

PLC process data output image (Command Restart)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	1	1	1	1	1	1	1	1
2	Restart delay time [ms*10]							
,,	…							
20	0x00							

Description Byte 1, “Control byte”:

Bit	Value	Description	Remark
D0...D7	0	No restart request	Dependent of the activated module, the response data may contain RFID tag data
	0->1	Restart request initiated	-
	1	Restart request active	-

Description Byte 2:

0x0 = Restart evaluation unit immediately (Default value)

0x1 .. 0xFF = Restart delay time. Time in [ms*10]

Description Byte 3…20:

Not used. Should be set to 0x00 within the PLC process data output image.

PLC process data input image (Command Restart)

Byte no.	Bit							
	7	6	5	4	3	2	1	0
1	1	**1**	1	1	1	1	1	1
2	Restart delay time [ms*10]							
,,	…							
20	0x00							

Description Byte 1, “Status byte”:

Bit	Value	Description	Remark
D0...D7	0	No restart active	-
	0->1	Restart initiated	-
	1	Restart active	-

Description Byte 2:

0x0 .. 0xFF Actualized restart delay time [ms*10]. Value is decremented from “Restart delay time” set in Control byte to 0x0. After that, the restart sequence is executed.

Description Byte 3…20:

Not used. Set to default value 0x0 by the evaluation unit.

13 Data frame examples

In the following examples the evaluation unit is configured for 2 Read/write heads at channel IO-1 and channel IO-2. The Read/write heads are connected on both channels. Channel 3 and channel 4 are unconnected.

The values shown in the payload traffic view are in hexadecimal notation. 30 = 0x30 = 48 decimal.

13.1 Read UID on request (synchronous mode)

13.1.1 Command sequence view

UK

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: no tag in field	Step 4: no tag in field	Remark
PLC process data output	Byte 1	0	0	0	0	0	0	0	
		1	AO	0	0	0	0	0	
		2	WR	0	0	0	0	0	
		3	RD	0	0	1	1	0	Set RD to 1 when TP = 1 is detected
		4	UR	0	0	0	0	0	
		5	ER	0	0	0	0	0	
		6	DR	0	0	0	0	0	
		7	0	0	0	0	0	0	
	Byte 2			0x00	0x00	0x00	0x00	0x00	
	Byte 3			0x00	0x00	0x00	0x00	0x00	
	Byte 4			0x00	0x00	0x00	0x00	0x00	
	Byte 5			0x00	0x00	0x00	0x00	0x00	
	...			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: tag left the field	Step 4: no tag in field	Remark
PLC process data input	Byte 1	0	TP	0	1 (1)	1	0	0	
		1	AI	0	0	0	0	0	
		2	WR-RDY	0	0	0	0	0	
		3	RD-RDY	0	0	0	0	0	
		4	UD	0	0	0	0	0	
		5	EF	0	0	0	0	0	
		6	DR-RDY	0	0	0	0	0	
		7	Diag	0	0	0	0	0	
	Byte 2 (UID length)			0x00	0x00	0x04	0x04	0x00	Data is hold until RD is set to 0
	Byte 3 (UID data)			0x00	0x00	0xE0 (2)	0xE0	0x00	
	Byte 4 (UID data)			0x00	0x00	0x04	0x04	0x00	
	Byte 5 (UID data)			0x00	0x00	0x01	0x01	0x00	
	…			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

(1) TP bit indicate that the RFID tag is detected by the Read/write head.

(2) UID data, the length is dependent from the RFID tag (125kHz = 4 Byte; 13,56 MHz = 8 Byte).

13.1.2 Payload traffic view

Command request send by controller:

080000000000000000000000000000000000000000**08**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Controller: “Read UID of the RFID tag edge controlled” on channel IO-1 and IO-2

Response send by evaluation unit when command has been processed:

0908e00401004c5f494c0000000000000000000000**09**08e00801138ca1d7cb0000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Evaluation unit: Send “Tag is in field” and UID data with length of 8 bytes from channel IO-1 and IO-2.

The UID can be read out again after sending control byte "00" and "08" to the evaluation unit.

13.2 Receive UID automatically (asynchronous mode)

The parameter "Read of UID edge controlled" must be set to 0x00 in the channel configuration.

13.2.1 Command sequence view

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: no tag in field	Step 4: no tag in field	Remark
PLC process data output	Byte 1	0	0	0	0	0	0	0	
		1	AO	0	0	0	0	0	
		2	WR	0	0	0	0	0	
		3	RD	0	0	0	0	0	No need for RD setting
		4	UR	0	0	0	0	0	
		5	ER	0	0	0	0	0	
		6	DR	0	0	0	0	0	
		7	0	0	0	0	0	0	
	Byte 2			0x00	0x00	0x00	0x00	0x00	
	Byte 3			0x00	0x00	0x00	0x00	0x00	
	Byte 4			0x00	0x00	0x00	0x00	0x00	
	Byte 5			0x00	0x00	0x00	0x00	0x00	
	...			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: no tag in field	Step 4: no tag in field	Remark
PLC process data input	Byte 1	0	TP	0	1 (1)	0	1 (1)	0	
		1	AI	0	0	0	0	0	
		2	WR-RDY	0	0	0	0	0	
		3	RD-RDY	0	0	0	0	0	
		4	UD	0	0	0	0	0	
		5	EF	0	0	0	0	0	
		6	DR-RDY	0	0	0	0	0	
		7	Diag	0	0	0	0	0	
	Byte 2 (UID length)			0x00	0x08	0x00	0x08	0x00	
	Byte 3 (UID data)			0x00	0xE0 (2)	0x00	0xE0	0x00	
	Byte 4 (UID data)			0x00	0x04	0x00	0x03	0x00	
	Byte 5 (UID data)			0x00	0x01	0x00	0x0C	0x00	
	…			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

(1) TP bit indicate that the RFID tag is detected by the Read/write head.

(2) UID data, the length is dependent from the RFID tag (125kHz = 4 Byte; 13,56 MHz = 8 Byte).

13.2.2 Payload traffic view

Command request send by controller:

000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Controller: “Receive UID of RFID tag automatically” on channel IO-1 and IO-2

Response send by evaluation unit when command has been processed and a RFID tag is detected on IO-1 and IO-2:

0108e00401004c5f494c0000000000000000000000**01**08e00801138ca1d7cb0000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Evaluation unit: Send “Tag is in field” and UID data with length of 8 bytes from channel IO-1 and IO-2.

13.3 Access to the User data of the RFID tag

To access the User data of the RFID tag, the IO channel has to be set into “user” mode. This can be done by setting the UR bit of the control byte to 1. In the following command sequence the RFID tag is in the reading field of the Read/write head.

				Step 0: Tag in field	Step 1: Activate bit UR	Step 2: Wait for bit UD	Remark
PLC process data output	Byte 1	0	0	0	0	0	Now the Read/write head is able to proceed read and write requests to the User data of the RFID tag.
		1	AO	0	0	0	
		2	WR	0	0	0	
		3	RD	0	0	0	
		4	UR	0	1	1	
		5	0	0	0	0	
		6	DR	0	0	0	
		7	0	0	0	0	
	Byte 2			0x00	0x00	0x00	
	Byte 3			0x00	0x00	0x00	
	Byte 4			0x00	0x00	0x00	
	Byte 5			0x00	0x00	0x00	
	...			…	…	…	
	Byte 19			0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	

				Step 0: Tag in field	Step 1: Activate bit UR	Step 2: Wait for bit UD	Remark
PLC process data input	Byte 1	0	TP	1	1	1	Now the Read/write head is able to proceed read and write requests to the User data of the RFID tag.
		1	AI	0	0	0	
		2	WR-RDY	0	0	0	
		3	RD-RDY	0	0	0	
		4	UD	0	0	1	
		5	EF	0	0	0	
		6	DR-RDY	0	0	0	
		7	Diag	0	0	0	
	Byte 2			0x08	0x08	0x00	
	Byte 3			0xE0	0xE0	0x00	
	Byte 4			0x04	0x04	0x00	
	Byte 5			0x04	0x04	0x00	
	…			…	…	…	
	Byte 19			0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	

13.4 Read User data of the RFID tag on request (synchronous mode)

With one command cycle up to 16 bytes can be read. To read more data, the command cycle has to be repeated with adapted address setting.

The control and status byte must have value “10” (UD activated) before the following command sequence can be started.

With one reading cycle (step 4 to 7) up to 16 bytes can be read. If more data shall be read

- the steps 4 to 7 have to be repeated and
- the address offset has to be counted up.

13.4.1 Command sequence view

				Step 1: Bit UD is true	Step 2: Start reading (1)	Step 3: Wait for bit RD-RDY (2)	Step 4: Reset bit RD	Step 5: Wait for reset bit RD-RDY
PLC process data output	Byte 1	0	0	0	0	0	0	0
		1	AO	0	0	0	0	0
		2	WR	0	0	0	0	0
		3	RD	0	1	1	0	0
		4	UR	1	1	1	1	1
		5	0	0	0	0	0	0
		6	DR	0	0	0	0	0
		7	0	0	0	0	0	0
	Byte 2 (data length)			0x00	0x08	0x08	0x00	0x00
	Byte 3 (address MSB)			0x00	0x00	0x00	0x00	0x00
	Byte 4 (address LSB)			0x00	0x10	0x10	0x00	0x00
	Byte 5			0x00	0x00	0x00	0x00	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

				Step 1: Bit UD is true	Step 2: Start reading (1)	Step 3: Wait for bit RD-RDY (2)	Step 4: Reset bit RD	Step 5: Wait for reset bit RD-RDY
PLC process data input	Byte 1	0	TP	1	1	1	1	1
		1	AI	0	0	0	0	0
		2	WR-RDY	0	0	0	0	0
		3	RD-RDY	0	0	1	1	0
		4	UD	1	1	1	1	1
		5	EF	0	0	0	0	0
		6	DR-RDY	0	0	0	0	0
		7	Diag	0	0	0	0	0
	Byte 2 (data length)			0x00	0x00	0x08	0x12	0x00
	Byte 3 (data)			0x00	0x00	0x12	0x34	0x00
	Byte 4			0x00	0x00	0x34	0x56	0x00
	Byte 5			0x00	0x00	0x56	0x56	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

(1) Data length and the memory address of the RFID tag has to be set.

(2) The reading data can be read out from byte 3, the length is dependent from the reading length.

13.4.2 Payload traffic view

Command request send by controller:

180A0002000000000000000000000000000000000000**18**1000100000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Controller: Read 10 bytes from channel IO-1 at address 0x0002 and 16 bytes at address 0x0010 from channel IO-2.

Response send by evaluation unit when command has been processed:

190A11223344556677889AA0000000000000000**11**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Evaluation unit: Send read User data of channel IO-1, channel IO-2 is not ready with response.

...

190A11223344556677889AA0000000000000000**19**101112131415161718191A1B1C1D1E1F000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Evaluation unit: Send “Tag is in field” and User data with length of 16 bytes from channel IO-1 and IO.

13.5 Write User data to the RFID tag (synchronous mode)

With one command cycle up to 16 bytes can be written. To write more data, the command cycle has to be repeated with adapted address setting.

The control and status byte must have value “10” before the following command sequence can be started.

With one write cycle (step 2 to 5) up to 16 bytes can be written. If more data shall be written

- the steps 2 to 5 have to be repeated,
- the address offset has to be counted up and
- the data to be written actualized.

13.5.1 Command sequence view

				Step 1: Bit UD is true	Step 2: Start writing (1)	Step 3: Wait for bit WR-RDY	Step 4: Reset bit RD	Step 5: Wait for reset bit WR-RDY
PLC process data output	Byte 1	0	0	0	0	0	0	0
		1	AO	0	0	0	0	0
		2	WR	0	1	1	0	0
		3	RD	0	0	0	0	0
		4	UR	1	1	1	1	1
		5	0	0	0	0	0	0
		6	DR	0	0	0	0	0
		7	0	0	0	0	0	0
	Byte 2 (data length)			0x00	0x08	0x00	0x00	0x00
	Byte 3 (address MSB)			0x00	0x00	0x00	0x00	0x00
	Byte 4 (address LSB)			0x00	0x10	0x00	0x00	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

				Step 1: Bit UD is true	Step 2: Start writing (1)	Step 3: Wait for bit WR-RDY	Step 4: Reset bit RD	Step 5: Wait for reset bit WR-RDY
PLC process data input	Byte 1	0	TP	1	1	1	1	1
		1	AI	0	0	0	0	0
		2	WR-RDY	0	0	1	1	0
		3	RD-RDY	0	0	0	1	0
		4	UD	1	1	1	1	1
		5	EF	0	0	0	0	0
		6	DR-RDY	0	0	0	0	0
		7	Diag	0	0	0	0	0
	Byte 2			0x00	0x00	0x00	0x12	0x00
	Byte 3			0x00	0x00	0x00	0x34	0x00
	Byte 4			0x00	0x00	0x00	0x56	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

(1) Data length and the memory address of the RFID tag has to be set.

13.5.2 Payload traffic view

Command request send by controller:

14040008C1C2C3C400000000000000000000000000**14**0A0020B1B2B3B4B5B6B7B8B9BA000000000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Controller: Write 4 bytes at address 0x0008 to User data of RFID tag at channel IO-1 and 10 bytes at address 0x0020 to tag at channel IO-2.

Response send by evaluation unit when command has been processed:

11000000000000000000000000000000000000000000**150A**000000000000000000000000000000000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Evaluation unit: Data write on channel IO-1 not ready, data write on channel IO-2 ready and confirmed with data length written = 10 bytes.

...

1504000000000000000000000000000000000000000000**15**0A000000000000000000000000000000000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Evaluation unit: Data write on channel IO-1 ready and confirmed with data length written = 4 bytes, data write on channel IO-2 ready and confirmed with data length written = 10 bytes.

13.6 Write verified to user memory to the RFID tag (synchronous mode)

The control and status byte must have bit UR and UD set to 1 before the following command sequence can be started.

13.6.1 Command sequence view

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: tag left the field	Step 4: tag left the field	Remark
PLC process data output	Byte 1	0	0	0	0	0	0	0	
		1	AO	0	0	0	0	0	
		2	WR	0	0	1	1	0	Set WR and RD to 1 when TP=1 is detected
		3	RD	0	0	1	1	0	
		4	UR	1	1	1	1	1	Set UR to 1
		5	ER	0	0	0	0	0	
		6	DR	0	0	0	0	0	
		7	0	0	0	0	0	0	
	Byte 2 (Data length)			0x00	0x00	0x10	0x10	0x00	Number of User data bytes to write
	Byte 3 (Address-H)			0x00	0x00	0x00	0x00	0x00	Address (H-Byte)
	Byte 4 (Address-L)			0x00	0x00	0x02	0x02	0x00	Address (L-Byte)
	Byte 5			0x00	0x00	0xAA	0xAA	0x00	User data byte 1
	Byte 6			0x00	0x00	0xBB	0xBB	0x00	User data byte 2
	..			…	…	…	…	…	…
	Byte 20			0x00	0x00	0x00	0x00	0x00	

				Step 0: no tag in field	Step 1: tag in field	Step 2: tag still in field	Step 3: tag left the field	Step 4: tag left the field	Remark
PLC process data input	Byte 1	0	TP	0	1 (1)	1	0	0	
		1	AI	0	0	0	0	0	
		2	WR-RDY	0	0	1	1	0	
		3	RD-RDY	0	0	1	1	0	
		4	UD	1	1	1	1	1	
		5	EF	0	0	0	0	0	
		6	DR-RDY	0	0	0	0	0	
		7	Diag	0	0	0	0	0	
	Byte 2 (Data length)			0x00	0x00	0x10 (2)	0x10	0x00	Number of bytes read from the RFID tag
	Byte 3 (User data)			0x00	0x00	0xAA	0xAA	0x00	User data byte 1 read
	Byte 4 (User data)			0x00	0x00	0xBB	0xBB	0x00	User data byte 2 read
	…			…	…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

(1) TP bit indicate that the RFID tag is detected by the Read/write head.

(2) Number of User data bytes read from the RFID tag.

13.6.2 Payload traffic view

Command request send by controller:

1C040008A1A2A3A400000000000000000000000000**1C**0C0020E1E2E3E4E5E6E7E8E9EAEBEC00000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Controller: Write 4 bytes at address 0x0008 to User data of RFID tag at channel IO-1 and 12 bytes at address 0x0020 to tag at channel IO-2.

Response send by evaluation unit when command has been processed:

1D04A1A2A3A400000000000000000000000000**11**000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Evaluation unit: Data write and read back from tag ready at channel IO-1 ready, data write on channel IO-2 not ready.

...

1D04A1A2A3A400000000000000000000000000**1D**0CE1E2E3E4E5E6E7E8E9EAEBEC000000000000
00000000000000000000000000000000000000000000**00**000000000000000000000000000000000000000000

Evaluation unit: Data write and read back from tag ready at channel IO-1 read, data write and read back from tag ready at channel IO-2.

13.7 Read User data of the RFID tag automatically (asynchronous mode)

The control and status byte must have value “10” before the following command sequence can be started.

13.7.1 Command sequence view

				Step 0: no tag in field	Step 1: no tag in field	Step 2: tag in field	Step 3: no tag in field	Step 4: tag in field	Remark
PLC process data output	Byte 1	0	0	0	0	0	0	0	
		1	AO	0	0	0	0	0	
		2	WR	0	0	0	0	0	
		3	RD	0	1	1	1	1	Set ER and RD synchronously to 1
		4	UR	1	1	1	1	1	Set UR to 1
		5	ER	0	1	1	1	1	
		6	DR	0	0	0	0	0	
		7	0	0	0	0	0	0	
	Byte 2 (Data length)			0x00	0x10	0x10	0x10	0x10	Number of User data bytes to read
	Byte 3 (Address-H)			0x00	0x00	0x00	0x00	0x00	Address (H-Byte)
	Byte 4 (Address-L)			0x00	0x02	0x02	0x02	0x02	Address (L-Byte)
	Byte 5			0x00	0x00	0x00	0x00	0x00	
	…			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

				Step 0: no tag in field	Step 1: no tag in field	Step 2: tag in field	Step 3: no tag in field	Step 4: tag in field	Remark
PLC process data input	Byte 1	0	TP	0	0	1 (1)	0	1	
		1	AI	0	0	0	0	0	
		2	WR-RDY	0	0	0	0	0	
		3	RD-RDY	0	1	1	1	1	
		4	UD	1	1	1	1	1	
		5	EF	0	1	1	1	1	
		6	DR-RDY	0	0	0	0	0	
		7	Diag	0	0	0	0	0	
	Byte 2 (Data length)			0x00	0x00	0x10 (2)	0x00	0x10 (2)	Number of bytes read
	Byte 3 (User data)			0x00	0x00	0x11	0x00	0xAA	User data byte 1
	Byte 4 (User data)			0x00	0x00	0x22	0x00	0xBB	User data byte 2
	Byte 5 (User data)			0x00	0x00	0x33	0x00	0xCC	User data byte 3
	…			…	…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

(1) TP bit indicate that the RFID tag is detected by the Read/write head.

(2) User data length of the RFID tag.

13.7.2 Payload traffic view

Command request send by controller:

3808000400000000000000000000000000000000**38**0C000800000000000000000000000000000000
0000000000000000000000000000000000000000**00**00000000000000000000000000000000000000

Controller: Read 8 bytes from channel IO-1 at address 0x0004 and 12 bytes at address 0x0008 from channel IO-2 automatically.

Response send by evaluation unit when command has been processed:

3800000000000000000000000000000000000000**38**00000000000000000000000000000000000000
0000000000000000000000000000000000000000**00**00000000000000000000000000000000000000

Evaluation unit: Send read User data of channel IO-1 and IO-2. Because no tag is present the read data length are set to 0x00.

After the command request is received, the evaluation unit always send one response to confirm the new mode.

...

3908A1A2A3A4A5A6A7A800000000000000000000**38**00000000000000000000000000000000000000
0000000000000000000000000000000000000000**00**00000000000000000000000000000000000000

Evaluation unit: Send data of channel IO-1, because tag is now present and could be read.

...

3800000000000000000000000000000000000000**38**00000000000000000000000000000000000000
0000000000000000000000000000000000000000**00**00000000000000000000000000000000000000

Evaluation unit: Send data of channel IO-1, because tag is no more present.

...

3800000000000000000000000000000000000000**39**0CB1B2B3B4B5B6B7B8B9BABBBC000000000000
0000000000000000000000000000000000000000**00**00000000000000000000000000000000000000

Evaluation unit: Send data of channel IO-2, because tag is now present and could be read

The automatically read mode is terminated when the bit "ER" is reset in the control byte of the command request.

13.8 Read diagnostics information

Dependent on the previously executed command, the diagnostic request must be prepared.

The control and status byte must have value "00" before the following command sequence can be started.

13.8.1 Command sequence view, read diagnostics in mode “Read UID”

				Step 0: diagnostics event	Step 1: set bit DR	Step 5: wait for bit DR-RDY	Step 6: reset bit DR	Step 7: wait for reset bit DR-RDY
PLC process data output	Byte 1	0	0	0	0	0	0	0
		1	AO	0	0	0	0	0
		2	WR	0	0	0	0	0
		3	RD	0	0	0	0	0
		4	UR	0	0	0	0	0
		5	0	0	0	0	0	0
		6	DR	0	1	1	0	0
		7	0	0	0	0	0	0
	Byte 2 (data length)			0x00	0x00	0x00	0x00	0x00
	Byte 3 (address MSB)			0x00	0x00	0x00	0x00	0x00
	Byte 4 (address LSB)			0x00	0x00	0x00	0x00	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

				Step 0: diagnostics event	Step 1: set bit DR	Step 5: wait for bit DR-RDY	Step 6: reset bit DR	Step 7: wait for reset bit DR-RDY
PLC process data input	Byte 1	0	TP	0	0	0	0	0
		1	AI	0	0	0	0	0
		2	WR-RDY	0	0	0	0	0
		3	RD-RDY	0	0	0	0	0
		4	UD	0	0	0	0	0
		5	EF	0	0	0	0	0
		6	DR-RDY	0	0	1	1	0
		7	Diag	1	0	0	0	0
	Byte 2			0x00	0x00	0x02	0x00	0x00
	Byte 3			0x00	0x00	0xF1	0x00	0x00
	Byte 4			0x00	0x00	0xFE	0x00	0x00
	…			…	…	…	…	…
	Byte 19			0x00	0x00	0x00	0x00	0x00
	Byte 20			0x00	0x00	0x00	0x00	0x00

13.8.2 Payload traffic view, read diagnostics in mode “Read UID”

Command request send by controller:

400000000000000000000000000000000000000000**40**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Controller: Read diagnostics information from channel IO-1 and IO-2.

Response send by evaluation unit when command has been processed:

4001F1FE020000000000000000000000000000000000**40**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Evaluation unit: Channel IO-1 had diagnostics information with 1 element. Diagnostics "Presence error, tag has left transmission window". Channel IO-1 has no diagnostics information.

Before a new diagnostics information can be read out, the DR bit within the Control byte must be reset.

Example how to reset the DR bit on both channels:

000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000
000000000000000000000000000000000000000000**00**0000000000000000000000000000000000000000

Controller: Remove diagnostics read request on channel IO-1 and IO-2.

13.8.3 Command sequence view, read diagnostics in mode “Read/write User data of the RFID tag”

				Step 0: tag in field	Step 1: diagnostics event	Step 2: prepare diag. read	Step 3: start diag. read	Step 4: end diag. read	Remark
PLC process data output	Byte 1	0	0	0	0	0	0	0	
		1	AO	0	0	0	0	0	
		2	WR	0	0	0	0	0	
		3	RD	0	1	0	0	0	Set RD=0 to read diagnostics
		4	UR	1	1	1	1	1	Keep UR=1
		5	ER	0	0	0	0	0	
		6	DR	0	0	0	1	0	Set DR to 1 to read diagnostics
		7	0	0	0	0	0	0	
	Byte 2			0x00	0x00	0x00	0x00	0x00	
	Byte 3			0x00	0x00	0x00	0x00	0x00	
	Byte 4			0x00	0x00	0x00	0x00	0x00	
	Byte 5			0x00	0x00	0x00	0x00	0x00	
	…			…	…	…	…	…	
	Byte 19			0x00	0x00	0x00	0x00	0x00	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

				Step 0: tag in field	Step 1: diagnostics event	Step 2: prepare diag. read	Step 3: start diag. read	Step 4: end diag. read	Remark
PLC process data input	Byte 1	0	TP	1 (1)	1	1	1	1	
		1	AI	0	0	0	0	0	
		2	WR-RDY	0	0	0	0	0	
		3	RD-RDY	0	1	0	0	0	
		4	UD	1	1	1	1	1	
		5	EF	0	0	0	0	0	
		6	DR-RDY	0	0	0	1	0	
		7	Diag	0	1 (2)	1	0	0	
	Byte 2 (Diag length)			0x00	0x00	0x00	0x01 (3)	0x00	
	Byte 3 (Diag data)			0x00	0x00	0x00	0xF1	0x00	
	Byte 4 (Diag data)			0x00	0x00	0x00	0xFE	0x00	
	Byte 5 (Diag data)			0x00	0x00	0x00	0x02	0x00	
	Byte 6 (Diag data)			0x00	0x00	0x00	0x00	0x00	
	…			…	…	…	…	…	
	Byte 20			0x00	0x00	0x00	0x00	0x00	

(1) TP=1 indicate that the RFID tag is detected by the Read/write head.

(2) Diagnostic detected by the evaluation unit.

(3) Number of error codes.

13.8.4 Payload traffic view, read diagnostics in mode “Read/write User data of the RFID tag”

Command request send by controller:

```
50000000000000000000000000000000000000000000000050000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
```

Controller: Read diagnostics information from channel IO-1 and IO-2.

Response send by evaluation unit when command has been processed:

```
5001F1FE020000000000000000000000000000000000005000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
```

Evaluation unit: Channel IO-1 had diagnostics information with 1 element. Diagnostics "Presence error, tag has left transmission window". Channel IO-1 has no diagnostics information.

Before a new diagnostics information can be read out, the DR bit within the Control byte must be reset.

Example how to reset the DR bit on both channels:

```
10000000000000000000000000000000000000000000000010000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
```

Controller: Remove diagnostics read request on channel IO-1 and IO-2.

14 Error codes of the evaluation unit

Error codes are signaled with bit “Diag” within the status byte of the response data of the evaluation unit. If more diagnostic events are available, the channel can transfer up to 4 diagnostics simultaneously. The hardware diagnostic events, which are device relevant, are indicated by the Diag bit on all channels.

Inactive channels can only transfer hardware diagnostic events.

Example:

Command response of the evaluation unit for command “DR”

C001**F4FE9000**

14.1 Error group RFID tag (F1FE)

Error group F1	Error code	Description
Tag/transponder	F1FE0200	Tag not present, tag has left the transmission window
Tag/transponder	F1FE0300	Address or command does not match the RFID tag characteristics, memory size invalid
Tag/transponder	F1FE0400	Tag is defective, replace tag or battery
Tag/transponder	F1FE0500	Overflow of the RFID tag memory UID > 16 bytes
Tag/transponder	F1FE0900	Command not supported by the RFID tag
Tag/transponder	F1FE0A00	Access error, e.g. block locked. See ISO18000-x
Tag/transponder	F1FE0B00	General tag error which is not specified in detail
Tag/transponder	F1FE0C00	Unknown internal error

14.2 Error group evaluation unit (F4FE)

Error group F4	Error code	Description
Evaluation unit	F4FE0100	Power supply failure
Evaluation unit	F4FE0200	Hardware failure, short circuit and overload
Evaluation unit	F4FE0201	Allowed temperature exceeded
Evaluation unit	F4FE0300	read/write head does not function because time out occurred
Evaluation unit	F4FE0400	Command buffer overflow of the IO server queue (Internal error)
Evaluation unit	F4FE0500	Data buffer overflow, memory allocation (internal error)
Evaluation unit	F4FE0600	Command is not supported in this mode (internal error)
Evaluation unit	F4FE8100	ID-Link Master inactive. i.e. after power on (internal error)
Evaluation unit	F4FE8200	Internal IO port server error (internal error)
Evaluation unit	F4FE8300	Invalid IO port parameter, e.g. channel (internal error)
Evaluation unit	F4FE8400	Vendor-specific error with the command PUT
Evaluation unit	F4FE8500	IO port server resets channel
Evaluation unit	F4FE8600	Data not available for delayed C/Q inputs or delayed UID (Internal fault)
Evaluation unit	F4FE8700	Reconfiguration of the IO port channel not yet allowed (internal error)
Evaluation unit	F4FE8800	Parameter flag of the IO port not set (internal error)
Evaluation unit	F4FE8900	General error detected by ID-Link master
Evaluation unit	F4FE8A00	CRC error detected by ID-Link Master
Evaluation unit	F4FE8B00	Object not found detected by ID-Link Master
Evaluation unit	F4FE8C00	Data read/write area in the command not valid
Evaluation unit	F4FE8D00	IO port channel reconfigured
Evaluation unit	F4FE8E00	The read/write head could not process the command, i.e. read/write length exceeded, tag memory error, write to locked block
Evaluation unit	F4FE8F00	Tag data length exceeded (block size * block number)
Evaluation unit	F4FE9001	Short circuit at output driver detected (C/Qo)
Evaluation unit	F4FE9002	Undervoltage at output driver detected (AUX or L+)
Evaluation unit	F4FE9003	Overload at output driver detected (L+ or C/Qo)
Evaluation unit	F4FE9004	Over temperature at output driver detected

Evaluation unit	F4FE9005	Wire break on the read/write head
Evaluation unit	F4FE9006	Upper limit reached at output driver.
Evaluation unit	F4FE9007	Undervoltage at C/Qo detected
Evaluation unit	F4FE9008	General read/write head error detected
Evaluation unit	F4FE9009	read/write head communication error
Evaluation unit	F4FE900A	I²C communication error (internal error)
Evaluation unit	F4FE900B	I²C communication parity error (internal error)
Evaluation unit	F4FE9401	Frontend error detected by the read/write head
Evaluation unit	F4FE9402	General error detected by the read/write head
Evaluation unit	F4FE9403	ID-Link error detected by the read/write head
Evaluation unit	F4FE9404	Buffer overrun (overflow???) error detected by the read/write head
Evaluation unit	F4FEA000	Invalid command code detected
Evaluation unit	F4FEA001	Invalid command parameter detected
Evaluation unit	F4FEA002	Invalid command data detected
Evaluation unit	F4FEA003	Invalid ticket number or ticket length detected
Evaluation unit	F4FEA100	Configuration of the evaluation unit failed (CR1 / CR2)
Evaluation unit	F4FEA200	Configuration of the IO channel failed (internal error)
Evaluation unit	F4FEA300	Reading of C/Qi / IQ inputs (internal error)
Evaluation unit	F4FEA400	Write to output C/Qo failed (internal error)
Evaluation unit	F4FEA500	High current setting failed (internal error)
Evaluation unit	F4FEA600	Reading of UID failed (internal error)
Evaluation unit	F4FEA700	Reading of the user data memory of the RFID tag failed (internal error)
Evaluation unit	F4FEA800	Writing to the user data memory of the RFID tag failed, command WU (internal error)
Evaluation unit	F4FEA900	Writing to the user data memory of the RFID tag failed, command WV (internal error)
Evaluation unit	F4FEAA00	Verification of the user data memory of the RFID tag failed, command "WV" (internal error)
Evaluation unit	F4FEAB00	Setting of the antenna field on/off failed, command "AN"
Evaluation unit	F4FEAC00	ID-Link master could not read the RFID tag blocks (internal error)

14.3 Error group Communication User – evaluation unit (F5FE)

Error group F5	Error code	Description
Communication user - evaluation unit	F5FE0800	Command is processed by another user (indicated by the evaluation unit)
Communication user - evaluation unit	F5FE8000	More than one command requested by user (DR, WR, Diag)
Communication user - evaluation unit	F5FE8100	It is attempted to abort the command for synchronous reading or writing
Communication user - evaluation unit	F5FE8300	Command parameter for asynchronous reading invalid

15 List of abbreviations

Definition	Remark
ACD	Address Conflict Detection. Procedure to detect IPv4 address conflicts as well as duplicate addresses. See RFC 5227.
Antenna	RFID antenna built in a read/write head
Assembly Instance	Assembly instances are instances of an I/O data block with predefined functionality which can be exchanged between several communication participants. It is known to the communication participants which data at which length is to be exchanged.
Block size	Size of one block of the RFID tag, e.g. 4/8/32 bytes
CIP	Common Industrial Protocol. Object-oriented description of a communication protocol for industrial requirements which is currently used by four different field buses (CompoNet, DeviceNet, ControlNet and EtherNet/IP).
Connection	Describes the logical connection between two application objects.
Controller	PLC e.g. Allen Bradley Compact Logix
DLR	Device Level Ring protocol. Supports the media redundance in a ring structure Ethernet environment.
EDS	Electronic Data Sheet ist a device description file.
Emergency system	Web server with reduced functionality to download the firmware of the evaluation unit
evaluation unit	RFID Identification unit DTE103
Explicit Messaging	Acyclic data exchange between I/O scanner and I/O adapter based on TCP/IP communication.
Hexadecimal	Numeral format, which use 16 values to represent a numeric value: 0..9, A, B, C, D, E, F
I/O Adapter	Comparable to a slave system (Target in EIP)
I/O Messaging oder Implicit Messaging	Cyclic data exchange between I/O scanner and I/O adapter based on UDP/IP communication.
I/O Scanner	Comparable to a master system (Originator in EIP)
Tag, transponder	RFID RFID tag, e.g. E80360, E80370
ODVA	Open Device Net Vendor Association
PC	Personal computer, e.g. desktop computer, notebook
PermData	Nonvolatile data area of the evaluation unit for storage of user specific settings, like fieldbus parameter, address settings and so on.
PLC	Programmable Logic Controller, e.g. Allen Bradley Compact Logix
Process data input image	Data area where the PLC can read the outputs of the external periphery devices. (%IBx)
Process data output image	Data area where the PLC can write to the inputs of the external periphery devices. (%QBx)
read/write head	RFID read/write head, e.g. ANT411, ANT513
User data	Data area of the RFID tag which can be read and written randomly
Web client	PC program to send “http protocol” requests, e.g. Firefox, Internet Explorer
Web server	Built in “http protocol” server to service request from a PC